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Medical Times

A Monthly Journal of Medicine, Surgery, and the Collateral Sciences

Vol. XLIV., No. 1 NEW YORK, JANUARY, 1916 Fifteen Cents a Copy One Dollar a Year

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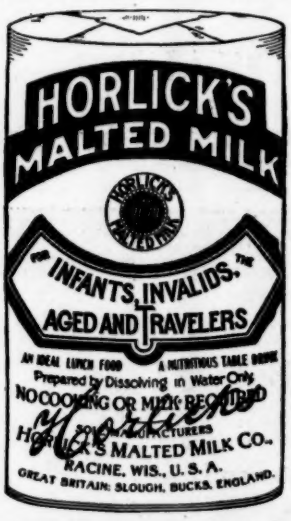
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Medical Progress During the Year 1915

MILITARY SURGERY.

COL. LOUIS A. LA GARDE, Medical Corps, U. S. Army, Washington, D. C.

In a review of the events and progress which have been made in military surgery in the last sixteen months it is of interest to note the ideas which were entertained about war wounds by the civilian surgeon before and since the commencement of the world war. Two years ago when the writer of this article was proceeding to meet his class in the Medical Department of the New York University he was met near the lecture hall by one of the prominent surgeons of this country who asked him what the topic of the lecture was to be. The answer was: "Military Surgery but Principally Gunshot Wounds." The distinguished professor murmured to himself several times, "gunshot wounds, gunshot wounds, that sounds like ancient history." The impression conveyed by this answer was that military surgery and war wounds were a thing of the past. No doubt there were at this time many surgeons who believed this to be a fact, and that a study of military armaments, the characteristic features of the wounds they cause, and the best means of treating them, were a waste of time since the occurrence of great and wicked wars could never again take place in our highly developed civilization.

The writer happened to meet this same professor again, about one year later as he was proceeding to meet his class, when the world war had been progressing four months, and the attention of the profession was concentrated on the unprecedented number of casualties occurring in the largest armies that have ever been marshalled in battle. The professor took occasion to comment upon the universal infection in the ugly wounds, received, and the supreme difficulties which the medical departments of the armies were encountering, and without reference to his comment of the year before, he said thoughtfully, "It looks as though we would all be lecturing on military surgery very soon."

There never has been a time in history when the subject of war wounds was so universally discussed by the profession than the present, and there has never been a time when the profession was getting more experience of a definite nature in the management of infected wounds.

In the review of military surgery at the present time it will be necessary to briefly comment on the engines of war that are instrumental in causing the wounds; to then consider the characteristic features of the wounds; infection; general treatment, and a consideration of wounds in certain anatomical parts.

Projectiles.—The projectiles of the military rifle employed in the present war are, with the exception of the French, British, German, and Turkish armies, ogival headed bullets, of an average of thirty calibers, about four calibers in length, and an average weight of 220 grs. The bullets are composed of a lead nucleus, enclosed in a hard steel jacket which surrounds the lead entirely except at the base. The average velocity of these projectiles is about 2000 f.s., the striking energy is 1954 f. lbs., and their penetration in green oak across the grain near the muzzle is about 28 inches. These projectiles are made to revolve on their short axis by the twist or rifling in the gun which describes one complete turn in about ten inches. The rate of revolution which is about 2400 turns per second as it leaves the muzzle gives the bullet stability in flight, so that its tendency is to travel point on, coincidently with its trajectory. Unless its position has been deflected in ricochet, it makes a regular impact on entering the body.

The bullet used by the French army, unlike the other bullets of reduced caliber in the military rifles of the nations, is composed of one solid piece of brass without an external mantle of steel; biogival in shape. The front part of the bullet comes to a distinct point; the rear ogive is slightly truncated; 8 mm in caliber; 39 mm or nearly five calibers in length, and about 12 grams .80 in weight.

The bullets used by the German and Turkish armies are virtually the same in all respects, and they are fired from the Mauser rifle of reduced caliber. The bullet is composed of a solid neucleus of lead enclosed in a jacket of hard steel; length 1.25 inches; 30 calibers; weight 150 grains. It is much shorter than the old ogival headed Mauser bullet, being barely 3 diameters in length. Its cylindrical part is not more than ¼ its length; the shape of the rest of the bullet is included in the part that tapers to a point. The bullet is illy balanced since its center of gravity is well disposed toward its base. Pointing the bullet diminishes air resistance

and the continuous danger space is increased to something like 750 yards.

The bullet of the British army is also pointed, shorter than the old ogival headed bullet used in the Lee Enfield rifle composed of a hard steel mantle and a nucleus made up of two metals, namely: lead and aluminum. The latter occupies the point of the bullet whilst the former occupies the cylindrical part of the jacket, weight of bullet is 152 grains.

The other projectiles which are concerned in causing war wounds are shrapnel, shell fragments, granades, bombs and aeroplane darts. Projectiles from pistols or revolvers cause a few war wounds, but the reported cases in the present world war are so few that they are negligible.

The shrapnel in modern artillery is a steel tube with a solid base; fired from three to six inch field-guns, or howitzers. The field gun shrapnel weighs about 15 pounds; it is about 10 inches in length, it has an initial velocity of 1700 f. s. and it is a man killer at 6500 yards. It is provided with a bursting charge composed of 2¼ ounces of black powder placed in a chamber at the base. A stopper of gun cotton is placed in the tube to hold the powder in place and to assist in the explosion. There are about 250 half-inch lead bullets in the three-inch shrapnel, more and larger bullets in the four and six-inch howitzer shrapnel. As the shrapnel explodes in space the tube drops to the ground and the bullets issue forth, as from a small gun, in an area of dispersion 100 yards wide and 150 yards long. The shrapnel is provided with a time fuse which can be set to cause it to explode in any one-fifth of a second in flight.

Shell fragments from field artillery are very numerous at the point of liberation of the exploding shell. The latter are principally used against material; they are hollow steel projectiles about 10 inches long, provided with a large bursting charge.

Grenades are composed of a hollow cylinder of metal filled with a high explosive which is made to burst on falling among the enemy. They are thrown by hand or fired from the end of the hand rifle. The fragments liberated are not unlike shell fragments, but smaller and of low velocity.

Bombs are containers made up of various substances like linen bags or empty shrapnel shells which are loaded with about 14 lbs. of the high explosives. They are thrown among the enemy at opportune moments. They are provided with a fuse of fulminate of mercury and they owe their ability to inflict wounds to the violent displacement of air as detonation takes place.

Aeroplane darts are made from pieces of steel rods, four inches long, pointed at one end, the diameter of a lead pencil which being liberated at great height descend with great velocity. They have been known to penetrate through the body and to cause death by internal hemorrhage.

The Characteristic Features of War Wounds are very much influenced by the velocity, size and shape of the missiles which inflict them. Shrapnel balls, shell and grenade fragments and the lesions from exploding bombs are marked by more or less laceration, contusion and the presence of hematomata, conditions which lend themselves to the spread of infection. It may be said that these wounds invariably show intense infection.

In describing the characteristic features of military rifle bullet wounds of the present day the features of machine gun wounds will be included in the same description since the latter and the military rifle employ the same ammunition.

The character of the wounds of the ogival headed bullets of reduced caliber differ materially at times from those of the pointed or Spitze bullets and they should be described separately. The ogival headed bullets were responsible for the majority of the wounds inflicted in the Spanish-American, Anglo-Boer and Russo-Japanese wars. They were then referred to as humane bullets, because in traversing soft parts having but little resistance like the fleshy parts of the limbs, the joint ends of bone and lung tissue, the track made by the bullet was but little more in diameter than its sectional area. The trauma thus inflicted had the character of an incised wound and healing took place readily with but few complications, if any. The wounds of joints which formerly were always troublesome to the surgeon were easily managed under the application of a clean dressing and immobilization. The lesion in the epiphyseal ends of bones was unattended with fragmentation except at nearby distances. Perforation without fissure marked the lesion in the vast majority of cases.

If the ogival headed bullet happened to collide with the skull, the diaphyses of the long bones and cavities like the stomach and intestine when these were loaded with fluid or semi-fluid masses, the amount of lesion was more or less great, depending upon the remaining velocity of the bullet. Within 500 yards and especially within 150 yards, the lesions are described under the term explosive effects. The lateral energy of the bullet has a tendency to displace the tissues in all directions and the amount of displacement, tearing and laceration, are coincident with the velocity of the projectile and the resistance encountered on impact. In such a lesion compound fractures are marked by much fissuring in the upper and lower fragments, loose pieces of bone may be driven into the tissues several inches from the point of impact in the bone, and the wound of exit is generally marked by a rent in the skin which may measure from 1 to 3 inches in its longest diameter, with torn muscle and tendons protruding. The same amount of marked destruction of tissue is observed in proximal shots of the head, when the bullet traverses the skull transversely or obliquely. The lateral energy exerted on the skull cap has been known to cause it to be blown away, but most generally there are fissures extending from the entrance to the exit wound which radiate toward each other.

The pointed bullet of the French army is longer, heavier and better balanced than those used by the Turks, Germans and English, and since it is composed of one solid metal it does not deform or break up so readily on impact against resistant structures, the wounds which it causes are attended with less laceration and breaking up of bone. The humane character of the wounds has been specially dwelt upon in the present war(a).

The pointed bullet used by the Turks and Germans are virtually the same in ballistic value. In the Turko-Balkan war the pointed bullet produced humane wounds in soft parts; and contrary to the belief concerning its superior penetration, it was found to lodge in a considerable proportion of the wounded. This may have been due to loss in the remaining velocity or to irregular impact made at long range. The Turko-Balkan war was fought in the open, at the ordinary battle ranges beyond the zone of explosive effects and the ugly wounds showing extensive destruction of bone tissue were uncommonly seen. The reporters were unanimous in the opinion that the bullet was made to turn side on by the least resistance, and that this fact added to the mortality in the wounds of the viscera and head. Wounds of the abdomen were specially fatal (b) and the patients seldom lived to reach hospital care.

The effects of the German pointed bullet have been dwelt upon at length by English and French observers. It is generally agreed that this unstable bullet is responsible for a large number of ugly wounds whenever bone involvement is present. It should be remembered that the most of the fighting in the present war is done at close range behind entrenched positions, a fact which adds to the severity of the wounds from a proverbially unstable bullet. When the pointed bullet makes an irregular impact against a hard bone like the shaft of the femur its nucleus and envelope are very apt to fragment. This is due to the escape of the lead from the base of the bullet and the subsequent fragmentation of the steel envelope when it strikes side on with great violence against any resistant structure. The characteristic features of such a wound are those of explosive effects: the foyer of fracture is marked by the presence of many small fragments of bone, bony sand. The fragmented bone, and as it often happens, metallic particles from the bullet, are driven forth, each acting as a secondary projectile. The soft parts are lacerated and torn in all directions. The wound of exit is large and reveals at once characters which point to the amount of energy which must have been liberated to cause such a wound. Injuries of this kind are badly infected from the beginning from many sources which will be dwelt upon in the discussion of infection.

The double nucleus of the pointed bullet used by the British army has been the subject of a great deal of controversy in the recent literature. In a paper on deforming bullets P. von Bruns (c) believes that the act of doubling the nucleus adds to the tendency to fragmentation when the bullet strikes resistant structures and that the effects are nothing short of those observed from dumdum bullets. The English added the aluminum point to their bullet because they wanted to render it more steady in flight. To do so it was necessary to lengthen the bullet. To lengthen it by elongation of the lead core must have added additional weight which was objectionable for the reason stated. They therefore sought to stabilize it by adding a lighter metal in the point. We believe they have a more stable bullet by so doing and we further believe that the disintegration of the bullet it is to be explained in the same way that the German bullet is apt to separate when it strikes resistant structures side on. It is very doubtful if one could find wounds with dum dum effects more often in German than in English wounded. It should be remembered that trench fighting takes place at close quarters, and that experimenters pointed out long ago that the hardness of none of the steel jackets was sufficient to withstand the resistance of the diaphyses of the long bones when the bullets were fired in cadavers at close quarters. When the U. S. Government made the change from the ogival headed 220 grain bullet, to that of the pointed projectile in present use, a bullet that is identical with that used by Germany and Turkey, we foresaw the highly destructive effects of the bullet because of its tendency to turn, and to break up when making an irregular impact against resistant structures(d). Hunters after large game(e) have noticed the slashing and other terrific effects of the Spitze bullet(f). It was a grievous error to have adopted this bullet by any of the nations, and when we remonstrated against its use we were told that it was necessary to adopt it because the bullet was lighter and the soldier was therefore able to carry more rounds per man; and also, because pointing the bullet diminished air resistance, and the continuous danger space was so markedly increased—from 500 to 750 yards —that for military reasons, all nations would have to adopt it.

Accusations and recriminizations have been common over the character of wounds in all wars, so that the present controversy is only another evidence of history repeating itself.

Infection of Gunshot Wounds and wounds in general has received new impetus in the present war. We are now realizing that the profession had become unfamiliar with infection in wounds, since the surgery of civil practice seldom affords an opportunity to treat infected wounds. The research laboratories at the front have given us interesting data on the bacterial flora of infected gunshot wounds, as compared to that of infected wounds from the traumata in civil life. As a rule the latter when infected are invaded by the ordinary pus producing microbes such as the strepto and staphylococci, coliform bacilli, bacillus proteus, etc. The more virulent microbes are seldom found. The infection is generally superficial, very accessible to antiseptic measures of treatment, and easily controlled.

Fleming (*Brit. Med. Jour.*, Sept. 18, 1915), gives his observations on the flora of war wounds which were worked out in the laboratory at Boulogne, France. The bacteriology of the clothing of the soldiers and that of the wounds were very similar. The wounds were mostly from bullets, shrapnel and shell fragments, and they were seldom sterile. The bacterial history of slight and perfectly drained wounds is shorter, and the wounds heal more rapidly.

Compound fractures of the long bones show three phases.

The first phase occupies the first week; the discharge is darkish brown, foul smelling, composed of blood altered by the growth of fecal organisms which are concerned in the primal infection. In this phase the more common bacteria are spore-bearing anaerobes, like bacillus tetanus and bacillus aerogenes capsulatus of Welch, associated with streptococci and other organisms.

In the second phase, lasting from the end of the first to the end of the third week, the discharge is less bloody, more purulent and the foul smell tends to disappear. There is a gross infection from non-spore-bearing fecal microbes, like streptococcus, bacillus proteus, etc.

The third phase is seen after the first three weeks. The fecal microbes now tend to disappear and they are replaced by pyogenic cocci and streptococci.

In the early stage there are also present highly putrifactive organisms but unlike the bacillus of Welch and Nicolaier, they are of unknown pathological significance.

The staphylococcus albus is a constant attendant in infected wounds, it seems to favor the growth of the bacillus of Welch, and Fleming believes that it promotes the incidence of gas-gangrene. In 127 wounds examined the bacillus of Welch was present in 103 in the first week; the bacillus of tetanus was present in 22 instances in the same length of time, and streptococci were observed in 102 of the wounds during the first week. As already stated these organisms tend to disappear in the later stages.

Other observers(g), Dudgeon, Gardener, and Bawtree have shown that severe infections are common in lacerated tissues in which the Welch bacillus, streptococci and coliform bacilli are pretty constant attendants. The bacilli of Nicalaier and Welch may abide in all wounds of lesser or greater severity without clinical manifestations. They are, however, found to grow more luxuriantly in wounds that are attended with a special amount of laceration, contusion, and devitalized tissue. Deep wounds with bone involvement having offensive discharge, are prone to harbor the bacillus of

Welch. Like Fleming, they believe that it is probably necessary that some other infection or condition be present for the bacillus of Welch to give rise to gas-gangrene. The latter bacillus has been known to survive four weeks from the date of infection without the presence of gas-gangrene, a fact which bears on the value of strict sterilization in the redressing of wounds.

Treatment of Gunshot Wounds.—The value of first aid at the front has been the subject of much criticism. The consensus of opinion favors the idea that first-aid in war is a failure. We believe that this is a sweeping arraignment against the use of first-aid which is undeserved. Formerly, we applied a clean first-aid dressing to the wound surrounded by a dirty field. Since the advent of tincture of iodine in ½ or ¼ strength as a skin disinfectant we are now in a position to apply a sterile dressing to a clean field. When we have done this we have simply used a method of preventing the introduction of additional dirt into an infected wound. Those who are acquainted with the wide-spread nature of the infection in gunshot fractures for instance, have never advocated the use of a first-aid dressing and the employment of a skin disinfectant with the hope of removing the *deep seated infection* of a gunshot wound.

In a symposium which was held in the American Ambulance, Paris(h), Alexis Carrel, who has had a wide experience at the front from the beginning of the war, states that no matter what is done, it is impossible with our present knowledge and skill to prevent infection in gunshot wounds.

One of the chief difficulties in the management of war wounds is the impossibility of the surgeon to command environments. In civil practice a compound fracture is taken to a well appointed hospital at once, but in military practice it may be hours, and at times days before a wounded man can be transported to the rear where suitable hospital care can be attempted. Meanwhile the local and constitutional effects of infection have been well developed and the task imposed upon the surgeon, especially in large battles, is enormous and overwhelming, and it often happens that a short personnel in the Medical Department will materially complicate the existence and continuance of the infection. These remarks apply more especially to the graver wounds. Those implicating soft parts only, most generally heal without complication, under a first-aid dressing. As to the management of the graver wounds, with bone involvement in the extremities, there seems to be a difference of opinion as to the manner of controlling infection, and the pros and cons have divided themselves into two schools prompted by the teachings of Sir W. Watson Cheyne(i) and Col. Sir A. E. Wright.

Cheyne believes that the removal of infection is easy of accomplishment with the use of strong antiseptics, like pure carbolic acid or some of its stronger dilutions. It was the method pursued by Lister in his earlier attempts, and it is equally applicable now. He dwells on the "hopeless view" of some surgeons in the attempt to remove infections from gunshot wounds by the use of antiseptics, and he states that this "is probably founded on experiments by LaGarde and others, carried out a good many years ago." In these experiments(j) we showed that the .45 caliber bullet from the Springfield rifle while traversing the soft parts of animals was capable of driving carbon particles, which had been previously placed on the skin, a distance of 17 mm. in the contused tissues, surrounding the channel made by the bullet. From this result we inferred that microorganisms could be distributed likewise. Cheyne is a firm believer in the diffusibility of carbolic acid. It may be the most diffusible of all the antiseptics, but we very much doubt if it is as far reaching as the limits of infection in a compound gunshot fracture exhibiting explosive effects.

Wright(k) is very much in accord with our own views(l) on the supreme task of readily removing infection in gunshot wounds which contain all manner of filth, including a variety of pathogenic microbes and spores. "The projectile takes these with it and it *implants them far beyond the reach of any prophylactic applications of antiseptics.*" (Wright.)

Rather than pursue the old time method of using strong antiseptics which seems to have gone out of favor, Wright believes that more good is to be attained by early and free drainage, which changes the closed infected wound into an open one. In addition to free drainage he recommends *lymph lavage* which is promoted by the use of some form of fomentation which produces active hyperameia. In addition he employs an irrigating hypertonic solution consisting of 0.5 per cent. of citrate of soda and a 5 per cent. salt solution. He further recommends the early use of vaccines against the Welch gas bacillus, and later the staphylococcus, streptococcus and bacillus proteus. He insists on frequent redressings. The moist dressing should be changed every 2 or 3 hours, or in some cases the wound should be placed in a continuous bath.

In later publications Wright(m) shows the limits of diffusibility of certain antiseptic solutions in pus in vitrio and in wounds. He condemns the use of antiseptics made up in viscid or semi-solid excipients as proposed by some authors, since they confine the discharges, impede drainage and act disastrously in infections with virulent microbes like that of B. aerogenes capsulatus. He recommends the following surgical procedure: (1) the opening of the wound by incision to obtain drainage for imprisoned infections; (2) washing out of the wound and irrigation of the walls with therapeutic fluids; (3) immobilization of the limb to avoid auto-inoculations from the wound; (4) ablation of the heavily infected and infiltrated walls and floor of the wound; (5) secondary suturing of the wound for restricting the area of exposed and infected surfaces and closing the wound when the infection has been overcome.

Tuffier(n), consulting surgeon to the French armies in the field, in speaking of the points learned in the present war insists that nearly all the wounds are attacked with grave infection and he dwells on the necessity of rapidly transporting the wounded to well equipped centers; the earliest possible extraction of foreign bodies; Chassaignac's drainage; immobilization of bones and articulations; the quickest possible disinfection of the wounds; the usual antiseptics have gone bankrupt, new ones must be found with a more permanent action.

He shares the opinion of Wright and dwells on the efficacy of light, good air, the free evacuation of discharges and for an antiseptic he recommends hypochlorite of magnesia by preference. Polyvalent and specific sera have no *prophylactic* value with the single exception of antitetanic serum. Tetanus has not been seen by him, with but one exception, in six months because of the universal application of prophylactic injections.

Dakin and Carrel (*Jour. Am. M. A.* [*Edit.*], Sept. 4, 1914, LXV, 880), have advocated the use of a new antiseptic which is the result of mixing sodium carbonate in a solution of chlorinated lime; the mixture is shaken and about one-half hour later the liquid is syphoned off and filtered; to this clear liquid boric acid

is added sufficient to make the preparation neutral or slightly acid. The reports from its use are very encouraging; the irritating qualities of the chloride of lime being neutralized by the addition of boric acid, is considered to be the redeeming feature of the solution.

Tuffier (*op. cit.*) mentions the frequent occurrence of gas gangrene which is the direct result of infection from the Welch bacillus. He divides the clinical cases into two groups: (1) A hyper-acute gangrene which spreads with great rapidity, sufficient to envelop the entire limb and end fatally within 24 hours. These cases appear to be beyond the control of the surgeon. (2) A superficial gaseous gangrene with the spread of the infection in the cellular tissue under the skin. This form is generally amenable when early and free incisions are made to relieve constriction. Depage, of Brussels, recommends the injection of oxygen in the cellular tissue beyond the infected area, a method which has been received with great favor. When this and other methods have failed, resort to amputation has been known to save life in a certain proportion of the cases. Delorme has recommended peroxide of hydrogen to be injected in the same way that Depage uses oxygen.

Tuffier states that in all of the cases he has seen at the front or rear, the lower limb is much more often affected than the upper, and that he has never seen a single case of gas gangrene following a wound of the skull, the face, the neck or even of the supra-clavicular region or of the chest.

The observers at the front in the trench fighting as it is now going on report fewer cases of gas gangrene with the duration of the war, and this is ascribed to the improved transport facilities which conduct the wounded to well appointed relief stations and hospitals in a very short time after the receipt of an injury.

Tetanus, which was very frequent and fatal on the western front during the beginning of the war, owing to the early injection of the serum and the prompt attention given to wounds, is now but seldom seen. The prophylactic injection is at present used in nearly all of the wounded with the first dressing.

Nicoll, M., Jr.(o) gives results in 20 cases of tetanus by the intra-spinal administration of antitoxin. He recommends the following method of administration:

(1) 3,000-5,000 units are injected into the lumbar region of the spinal canal, preferably under an anesthetic, the volume of the fluid being brought up to 10-15 c.c. by the addition of sterile normal saline, the exact amount being regulated by the age of the patient, and the amount of spinal fluid withdrawn.

(2) 10,000 units are used intravenously at the same time.

(3) Repeat the intra-spinal dose in 24 hours.

(4) Administer 10,000 units subcutaneously, three-four days later.

(5) Observe quiet, subdued light, and the use of sedatives.

The incubation period in the 20 cases ranged from 7-11 days; 16 of the 20 cases got well, and Nicoll believes that although a few of the cases might have recovered without the intra-spinal injection, the results are so much better than the intra-venous and intra-muscular methods that he cannot help but claim better results by his method. In each case the serum was given intra-spinally and repeated when the symptoms indicated.

Shock naturally occupies a very important position among the symptoms of gunshot wounds. The observers, in a number of instances in the weakened condition of the heart, have noticed the tendency to sudden hemorrhage when the heart action has been re-established and the blood pressure restored; the prognosis is grave in shock with severe injury when the temperature falls to 96°F.; the wounded who fail to recover their temperature in about four hours should be considered as seriously injured and unfit to undergo operation. The thermometer is an unfailing indication as to when operative interference is permissible; operations beyond ligation of vessels to arrest hemorrhage are to be avoided during shock; transport, unless imperative should be delayed.

The therapeutic and other indications in shock have been the same in this war as formerly. Tuffier recommends the subcutaneous injection of morphin to those who, on account of the emergent conditions of war, have to be transported, and he says that he can testify to its efficacy in hundreds of cases. It may not be amiss to state here the very good results that were reported from the Russo-Japanese war with the use of liquor camphorae.(p) The Japanese used it as follows:

Camphor	1 part
Ether	4½ parts
Olive Oil	4 parts

This mixture was used hypodermically and it was the favorite remedy on the firing line.

Incision and Excision: Milligan(q) and others advocated excision of the infected and devitalized tissues in wounds wherever this is practicable. With a sharp knife under strict aseptic procedure they incise around the injured tissues beyond the contused area and excise the walls and floor of the wound. This is specially applicable in furrowed wounds from shell fragments. After the excision has been made the operator puts aside his instruments and gloves, and with a clean armament he proceeds to suture the wound as we do in operative wounds. Extreme care is enjoined not to invade the infected area by the instruments during the incision and excision process.

Colonel Gray, R. A. M. C., in the Military Hospital at Rouen, has treated a long series of cases by excision. Ordinarily, as pointed out by Wright (r), the surgical practice has hitherto been limited to removing only those portions which are sloughing, and to amputate, where a limb is involved, only that portion which is deprived of its blood supply or quite hopelessly infected. To Col. H. M. W. Gray is due the credit of carefully excising devitalized and infected tissues in recent wounds. Under a wise selection of cases he has had remarkably good results(s). His cases were principally scalp wounds, *punched in* and gouged out wounds of soft tissues. At the same time that one can thus remove infected portions of tissue, the chance of leaving infection in the clean wound and the consequence of shutting infection in the tissues must always appear to be a risky procedure. High velocity projectiles often force infection to quite a distance beyond the area of impact when only soft parts are involved. When infection has been driven in 2 or 3 inches, as we find in bone involvement, the propriety of using the method of Gray is very doubtful.

Hemorrhage.—External primary hemorrhage is not frequently seen in the present war. It is naturally treated by ligation or constriction at the front. Tuffier and others comment on the harm that comes from the too liberal distribution of tourniquets in the field equipment of the members of the relief corps. They are too frequently applied, by the ignorant, and do more harm than good. This has been the experience in all wars. Secondary hemorrhage is more frequent in this

war because wound infection is very common. It is seen in cases as a result of weakening of the coats of vessels from infection, by the giving way of clots or the scab, and by the displacement of a splinter or other foreign body. Tuffier states that if the focus is aseptic and easily got at, he employes ligature at both ends of the injured vessel in the wound. When the seat of injury is not easily reached or if the wound is gangrenous or infected, he ties the artery on the proximal side in healthy tissue. In cases in which there is a traumatic aneurism—an interstitial hemorrhage—a condition nearly always consequent upon the passage of a bullet, in which the cutaneous orifices have healed, he recommends ligation of the two ends in the wound. He observes that gangrene of the lower limb is frequently seen in these cases.

Bier(t), in commenting on the surgery of the blood vessels, at the great Congress of Military Surgeons in Brussels during the current year, speaks of having treated aneurism in almost all of the larger and medium sized arteries; forty-five of them were arterial and fifty-six arterio-venous. The best treatment is suture of the artery. It was performed in 74 cases and in most of the instances the suture line was along the axis of the vessel; in only 3 cases was transverse suture performed. Lateral suture in arterial aneurism is a simple operation. In 36 cases of arterio-venous aneurism the wounded piece of artery was resected and the ends were sutured circurally by bringing the interna to the interna and then inserting a continuous suture. When large veins were involved through infected aneurisms they were ligated above and below and resected. Suture of the vessels should not be attempted in infected aneurisms. He found some danger in the ligation of arteries which resulted in gangrene when least expected. Many aneurisms recovered spontaneously. The latter experience corresponds with that of the surgeons in the Russo-Japanese war. Spontaneous cure was seen often in the circumscribed variety of aneurism. This was in the case of vessels surrounded by dense tissues like the popliteal, and where the tumor was of small size, seldom larger than a hen's egg.

The treatment of aneurismal-varix and varicose aneurism is the same as that of other forms of traumatic aneurism. Rest in bed; in the case of a limb, immobilization with a plaster of Paris split will insure absolute quiet; operative treatment depends upon the vessels affected and the amount of disturbance present. The vessels of the upper extremity offer the best results for operative treatment, and this is especially true of the brachial and its accompanying vessels. Implication of the vessels of the forearm seldom show serious symptoms and require no operation. In the leg the tibial vessels may be operated upon with safety. In the thigh the femoral and popliteal vessels should not be operated upon, except in cases of necessity. The most effective operation in both forms of artio-venous communications is ligation of the artery above and below the point of communication, without reference to the vein.

After-Treatment of Wounds.—Bloodgood (*Prog. Medicine,* Dec., 1915), calls attention to the so-called 12 commandments for the prevention of crippling. They are placarded in the battle and hospital zones of Germany as follows(u):

1. Remember that rest for joints (stiffness) and muscles (atrophy and loss of strength) is injurious.

2. Do not depend that, after the tissue lesions have healed, impaired motion can be overcome by orthopedic or medicomechanical after-treatment, but seek with all means at your disposal to prevent it and in grave cases refer the patients for after-treatment as soon as possible, in order that much time, effort and money may be saved.

3. Confine fixation of the joints to a minimum and strive to frequently interrupt it as soon as the healing of the wounds and fractures permits (change angle of position, motions).

4. Preserve as much as possible the precious strength in muscles jeopardized by rest, by early, regular massage, electrization, and, under your own supervision, by active motions by the patient himself, with and without external resistances.

5. Bear in mind that extensor muscles succomb to atrophy much sooner than the flexors. Strive of all things to preserve for the arm its elevator (deltoid muscle) and for the knee its extensor (quadriceps femoris), for it is their weakening that most seriously impairs the function of the affected limb.

6. When the tissue lesions render protracted fixation unavoidable, place the joints in such positions that their eventual ankylosis will render it the least difficult for the affected limb to function, namely:

The *shoulder-joint* in the usual position of rest secured by a sling.

The *elbow-joint* at right angle.

The *forearm-joint* in inward rotation (pronation).

The *wrist-joint* in the over-extended position naturally assumed when writing or firmly closing the fist.

The *finger-joints* slightly flexed.

The *hip-joint* slightly flexed and abducted.

The *knee-joint* slightly flexed.

The *ankle-joint* about at right angle and at slight inward rotation (supination).

7. Prevent the hand of an arm resting in the sling from gravitating into the flexed position, for this favors ankylosis of the fingers in extension and interferes with closing the fist.

8. Maintain the motility of the fingers. Do not unnecessarily include them in dressings, and never omit to admonish the patient to save his fingers from stiffening by continual extensive movements.

Preserve for the wounded his natural grasping apparatus, for an artificial hand is without sensation and therefore less valuable than a living remnant.

9. Stimulate the circulation of the blood in bedridden patients by motions of the limbs, also deep respirations, for increased circulation of the blood lends the inner organs beneficial stimulations and increases the nutrition and regenerative powers of the tissues.

10. Dispose of blood early extravasated into the tissues by means of measures furthering absorption (elevation, massage, heat, alternating douches, etc.), for coagulated blood acts as a constant irritant leading to adhesions in the organs of motion and, when present in large quantities, to the formation of masses of connective tissue. These latter, as a rule, cannot afterward be gotten rid of in all cases completely. Bear in mind that the blood and lymph circulation is interfered with more in the *ends* of the limbs and that spontaneous absorption must here, under all circumstances, be aided by artificial means.

11. Do not consider it below your dignity to early seek the advice and aid of an experienced colleague in all doubtful cases and, where your own technical ability does not seem sufficient, for you will learn thereby, and the injured will profit by it.

12. Do not despise the purely mechanical, for our

motor apparatus is a marvellous mechanism. But only he is able to set in motion a complicated machine who knows its mechanism and is a good mechanic himself.

Gunshot Wounds of the Head.—The reports of gunshot wounds of the head do not alter the statistics as to mortality from gunshots of this region in previous wars. Necessarily they have always been among the most fatal of war wounds. The present European war has emphasized the greater frequency of head wounds since the adoption of the new armament. Because of the superior penetration, long range, and superiority of marksmanship today with the weapons in use, as compared with former times, the tactitions drill their troops to fight behind cover as much as possible. The proportion of head wounds to the total number of wounds received when men fought standing was about 8 per cent. After the introduction of the new armament in the Anglo-Boer, Spanish-American and Russo-Japanese wars, the proportion of head wounds ranged between 15 and 20 per cent. Although there are no exact figures available from the present war it is generally agreed that the trench fighting, at least, will give a much larger percentage.

Gunshot lesions of the skull with and without lesion of cranial contents offer nothing new beyond what was gathered from recent wars. The prompt operative interference in every case that offers any hope of recovery holds as good today as it did before. The time for operation is immediately after the receipt of the injury, because head wounds are all badly infected, and delay means sepsis.

Roberts(v) calls timely attention to the treatment of gunshot injuries of the head with special reference to minor injuries. A careful examination of the patients should be made for any disturbance of cerebral function. The optic discs should be examined. The high velocity rifle bullet striking the skull at a tangent is prone to fracture the inner table however lightly it may injure the outer table, on account of the molecular disturbance transmitted on impact. This is especially true when compared to the lesion caused by a non-penetrating shrapnel bullet or piece of shell when travelling at low velocity. The presence of local paralysis, local spasm, epilepsy and persistent headache should be viewed with suspicion. In such cases there may be propulsion of fragments of bone from the inner table into the brain substance; the dura may be lacerated, by displaced bone, which may spring back again, and the momentum imparted to the superficial pulped area of brain substance may force that inwards, or the commotion above mentioned may be transmitted onward, causing a tract not unlike that made by a foreign body. The pieces of bone removed at the operation should be carefully examined, to see that none are missing; when necessary, the tract should be explored with the finger. Even though the dura is not lacerated, disintegrated brain substance may be present, and when it is, it should be let out through a crucial incision in the dura.

Roberts recommends excision of the scalp wound beyond the contused area, including the peri-cranium; the whole of this tissue is removed. The instruments used are then rejected. In most cases there is now an uninfected wound to be dealt with. The wound should never be enlarged by incision through its septic edges. If thorough examination of the bone shows no injury and there are no brain symptoms, the wound is sutured without drainage. If fracture is discovered and it is necessary to obtain more room, unless the lesion is extensive or multiple, it is best to give more room by incising the edge of the wound rather than turning down a flap. A half inch trephine crown is raised and the possibly infected bone cut away, with craniaectomy forceps; all loose fragments are next removed; if the dura is uninjured the wound is closed without drainage and mastic wound varnish and gauze are applied. For 24 hours a firm compress of gauze is maintained.

When laceration of brain is found the tract is gently explored, fragments of bone and metal removed; a drain is placed in the brain, and the wound closed as before.

Urotropin, gr. XX, three times a day, should be given in all head cases from the date of admission.

The extreme caution used by Roberts to prevent infection of his operative field is becoming popular in the treatment of infected wounds and it is particularly applicable in head wounds.

In penetrating and perforating shots, it should be employed at the wound of entrance and exit when practicable. All bone fragments and other foreign bodies should be gently removed and the lesion in the brain carefully explored with the gloved finger for foreign bodies. The wound should then be closed with or without drainage.

Gordon Holmes and Percy Sargent (*Brit. Med. Jour.*, Oct. 2, 1915) have published their observations on Symptoms of Injury of the Longitudinal Sinus, which point to conditions rarely seen in civil practice and uncommonly seen in clinical pictures.

The vascular lesions of the brain met with in civil life are generally due to arterial disease, while primarily affections of the cerebral veins are uncommon. In gunshot fractures, especially tangential shots, disturbance of the cerebral venous circulation is frequent, owing to the superficial course of the cerebral veins. The thinner walls and the lower pressure of the blood that flows through them make them more liable to be blocked by slight pressure than the arteries. Striking clinical effects are produced when the cranial sinuses, into which these veins flow, are affected and naturally the most common sinus to be involved is the superior longitudinal sinus. The striking difference in the palsies noted was the rigidity in the limbs and the distribution of the paralysis and its relative severity in different segments. When the upper limb is affected the finger movements escape or are only involved for a short time after the injury and rapidly recover to regain their normal power. The hand movements do not remain weak long, except when the sinus lesion is complicated with an independent injury of the brain. The wrist and elbow movements are affected more severely and recover less rapidly, and the same is true of the shoulder movements. This is the reverse of what occurs in ordinary hemiplegia. The distribution of the palsy in the legs is the converse of that in the arms, in all cases of sinus lesion.

The rigidity is more striking than the unusual distribution of the paralysis; it is co-extensive with it and closely related to it in a degree. It is a very early symptom, appearing within 24 hours of the receipt of the injury.

When operation is necessary it is advisable to remove bone all around the depressed area, and only then elevate this, for if hemorrhage occurs the surgeon is then in a more favorable position to control it. Bleeding from the sinus or its lacunae occurs when the fragments of bone are removed, but it may generally be arrested by pressure with a piece of pericranial tissue.

keeping it in position for a short time; this is used in preference to a gauze plug which is only recommended when the sinus is completely divided or much lacerated. Experience has shown that immediate operative interference is unsatisfactory. Of 39 cases observed which were operated upon, 15 died; only one died out of 37 cases not operated upon before transference to England. The latter group were, however, lighter cases. Uncomplicated cases show a remarkable tendency to improve, a fact due, no doubt, to the free venous anastomosis permitting a re-establishment of the circulation.

According to Tuffier (op. cit.), all the French surgeons of note treat gunshot fracture of the skull by immediate trephining. Transport of these cases to the rear is prohibited by order and they remain in the field hospitals until they are out of danger. Attempt to remove lodged missiles should not be undertaken, except when they have been located by the *x*-ray or other evidence in accessible parts of the brain substance.

The painstaking efforts of the surgeons, to avoid the consequences of septic conditions in the brain, will no doubt lessen the large number of cases with later cause brain disturbance and complications. Meningitis, hernia cerebri, and brain abscess, complications following septic conditions, will be fewer, and fatality from head wounds will be lowered since these complications generally end in death.

Gunshot Wounds of the Spine.—The reports from the front in the present war on gunshot wounds of the spine have added but little to what was gathered in the wars which have been fought since the adoption of the steel-clad bullets used in the military rifle and machine guns. The lesions encountered in the bony framework of the spine by the ogival headed bullet were generally marked by a clean cut perforation in the centra, and more or less fragmentation in the neural arches. In those cases showing pressure from spicules of bone or a bullet, laminectomy was occasionally performed with benefit in the Anglo-Boer and Russo-Japanese wars. As pointed out by Mr. Makins(w), in the Anglo-Boer war, the amount of energy which is conveyed in the form of vibratory force through the bony framework of the spine is responsible for certain pathological conditions that cause temporary and at times permanent loss of function. Mr. Makins demonstrated that in the lighter injuries, as well as the more severe ones, the bullet had in no way entered the bony canal. He likens the slight cases to the form of spinal concussion noticed in civil practice from causes such as railway collisions. The cases showed transient symptoms, there were no deaths and no opportunities to note anatomical changes. In the severe cases there was parenchymatous hemorrhage and subsequent degenerative changes, ending with complete disorganization of the cord. In the latter group of cases laminectomy is not called for.

Tuffier, in his summing up of the lessons learned in war surgery in the first five months of the present war, states that the proportion of cases of compression which call for laminectomy is very small. Cases demanding operation interference are easily worked out by clinical evidence in addition to the findings by the Roentgen-ray, which is all important. The fatality in the present war among spinal injuries is specially mentioned by a number of observers, and we suspect that the instability of the pointed bullet, which is prone to turn when encountering the least resistance, has a great deal to do with the increased mortality.

Peripheral Nerves.—Delorme(x) and others have advocated immediate resection and suture of injured nerves. This plan has not been adopted by surgeons as a rule. It may be advisable when one finds a divided nerve in the field of some other operation. The fact that so many divided or partially divided nerves heal and resume their function after the lapse of a few weeks or months has always favored delay in these cases. Delay is often made necessary on account of sepsis in the wound. When the opportunity arises to suture a nerve at the time of the primary dressing, this is to be accomplished under strict asepsis.

Observers in this war are unanimous in the belief that there are more complete division of nerves among the nerve wounds than ever before, and this is what one might expect from injuries by the pointed bullet, as a result of its key-holing effects.

Gunshot Wounds of the Chest.—Wounds of the chest were classed among the humane wounds in all of the wars since the advent of the new military rifle up to the Turko-Balkan war of 1912-1913. In this war there were two factors not observed in previous wars to add to the fatality of all body wounds; one was the large increase in number of shrapnel wounds, and the other was the introduction of the so-called spitze or pointed bullet used by the Turkish army, and originally introduced by the Germans in their army.

It is generally agreed by the observers in the present war that the wounds of the thorax by the larger shrapnel balls are very fatal. Some of these balls from the 3-inch field-guns are about .38 caliber, but the majority are from .45 to .60 calibers. These projectiles nearly all lodge in lung tissue and this fact adds to the gravity of the wounds. The characteristic features of the injury which they inflict are not unlike those observed in penetrating wounds from the old armament used in the Civil and Crimean wars. The mortality in these wars was very high—62.5 per cent. in the former and 91.6 per cent. in the latter (French army). When we reflect that these statistics were culled from those who reached hospital care only and not from those who died outright on the field, the mortality of chest wounds by a large, heavy bullet in war is appreciated all the more.

The 150-grain pointed bullet, as it loses its balance, is doubtless adding to the field mortality in the present war. In cases where the bullet happens to make a regular impact, the humane features observed with the use of the ogival headed 220-grain bullet is noted. This fact is commented upon by observers who have taken pains to study cases.

Piery(y) comments on the course observed in 53 cases of wounds of the chest in the present war. In simple cases there was a pneumonic process accompanied by hemothorax; hemoptysis was present in half of the cases observed. Resolution of the pneumonia and absorption of the bloody effusion are slow. Of 25 cases of uncomplimented wounds all made good recoveries. The principal part of the treatment is rest in bed; the convalescence is usually slow; operation for haemothorax is seldom indicated; removal of projectiles even when they are accessible should be delayed as long as possible; great care should be taken to ward off an attack of cold in convalescence.

The complications are pneumothorax; secondary suppuration of hemothorax; primary pyo-thorax; fracture of ribs, or abdominal wounds. Treatment of complications consists in evacuating pus as soon as discovered.

Tornai(z) treats persistent hemothorax which causes compression of the lung with systemic puncture as

follows: At the first puncture, 300 to 500 ccm. of blood are removed; in three or four days it is repeated, when a like amount of blood is removed; if necessary, the operation is repeated in one week. The method is particularly applicable in war surgery, since it is practiced in healthy men of good resistance. In civil life, the method has not proven successful because haemothorax is so often due to tuberculosis. He used puncture in 36 cases. They all returned to the front for duty in a short time. Four of the successful cases had tuberculosis which was reawakened by puncture. Tuffier (op. cit) dwells on slow convalescence in some cases; it is accompanied by prolonged febrile disturbance and puncture becomes necessary when it is accompanied by dyspnoea. He makes the point that the red fluid withdrawn is not always blood, since it does not coagulate in a vessel in which it has stood for 24 hours. The fluid, after several consecutive punctures, had the same characters. Empyema, usually due to presence of a foreign body or wounds cause by the bursting of a shell, is treated by early thoracotomy, and they nearly all get well when the conditions are favorable.

Sauerbruch and Borchard(a1) call special attention at the Meeting of Military Surgeons at Brussels during the current year to the serious nature of chest wounds in the present war, doubtless due to the greater proportion of wounds with shrapnel and shell fragments. The dangers are from pneumothorax, hemorrhage and infection. All lung wounds should be kept quiet two weeks or longer before transportation is permitted.

Penetrating and Perforating Wounds of the Abdomen.—The divergent views as to treatment of gunshot of the abdomen in civil and military practice are not as great or apparent since the experience in the present European war as it was formerly. Wounds of the abdomen by the ogival-headed bullet of reduced caliber in previous wars had conveyed the impression that the character of these wounds in a certain proportion of the cases was so benign that they naturally recovered without operation. Whether this was true or not the fact remains that cases frequently recovered in which the wounds of entry and exit pointed to intestinal and other visceral involvement. The happy outcome in these cases was attributed to the passage of the bullet between knuckles of intestine without opening the lumen of the gut, a traumatism that is known to have occurred as shown during operation and also on the postmortem table. It is generally supposed to be a very rare condition and one which could not altogether explain the frequent recoveries noted in modern wars. It has been further adduced that the perforation of the gut by the new rifle bullet being very small, had a tendency to close up and thereby prevent extravasation and that this was one of the reasons for the spontaneous recovery of a certain percentage of abdominal wounds. This is doubtless true since we know that in such a small lesion the tendency toward occlusion of the opening in the gut is favored by eversion of the mucosa. Another reason for an apparently larger percentage of recoveries without operation was the fact that the data was generally culled in field hospitals among cases that had survived one to several days after the battle before they were brought under the surgeon's care and amid favorable surroundings for operative work. In computing the mortality in this class of cases, one took no account of the fatality of those which survived only 6, 8 and 24 hours. Until the present war the battle conditions had not favored early operation and no studied attempt had been successfully made to provide operating-room facilities close to the fighting front.

The influence of the marked use of field artillery employing shrapnel and the pointing of the rifle and machine gun bullets in adding to the mortality of abdominal wounds was first brought out in the Turko-Balkan war. The Bulgar and Turk observers were unanimous in reporting upon the fatality by the shrapnel, and the Bulgar observers all dwelt on the fatality attending abdominal wounds by the pointed bullet of the Turks. Many of the observers comment upon the scarcity of abdominal wounds treated in field hospitals, the inference being that nearly all wounds of this region had ended fatally.

The following are the rules which were formerly layed down as Contraindications to Operation and Indications for Operation, and the majority of them hold good now.

Contraindications to Operation.—(1) A moribund condition or increasing shock bordering upon profound collapse with impending death, contraindicates surgical aid.

(2) If twelve hours have elapsed since the receipt of the injury the chances of recovery are bad. The surgeons in each case should, however, be the judges of the advisability for operation, using the condition of the patient as a guide.

(3) When symptoms of peritonitis are evident, there is but little hope of recovery from operation.

(4) Unfavorable environments, inexperience on the part of the attending surgeon and his assistants, materially reduce the chance for recovery after operation.

(5) Avoid operation on cases complicated by severe wounds of the chest, such as would contraindicate the use of an anesthetic.

(6) It is a question if operation is advisable in cases where the point of entrance is some distance from the mid-line of the abdomen, with the course of the ball ranging antero-posteriorly. Still, if operation is done under favorable environments no harm can result. In these cases the large intestine has generally suffered perforation. The perforation lies in contact with the parietal peritoneum, the intestine is immobile, and in the case of perforation from small calibers, the intestinal contents being solid, extravasation is infrequent.

(7) When the patient is doing well, as often happens in military practice after gunshot by reduced calibers eighteen to twenty-four hours after the receipt of the injury, operation should be withheld. Peritonitis more or less localized is present in all these cases, and handling of the inflamed peritoneal surfaces in search of perforations will do more harm than no operation. Indications for operation in localized peritonitis may show itself later, and when it does, the danger from operation is trifling. Again cases that have survived eighteen to twenty-four hours in military practice especially belong usually to that class in which extravasation has failed to take place as a result of the small wound caused by the rifle bullet. This small opening is usually closed by hernia of the mucosa and exudation of plastic lymph, before extravasation has had time to take place, and finally, some of the cases in military practice which have shown negative or trifling symptoms after the lapse of the time above referred to, no doubt belong to the rare class of cases that sustain no perforation, although the small bullet, as already pointed out, may have crossed the intestinal area.

(8) Laparotomy in military practice during active

field conditions has proven a failure for a number of reasons. Military surgeons in campaign seldom get the opportunity to operate early. The cases are first seen at the advanced stations where the facilities for abdominal work seldom exist. The lack of water and sterile dressings, the difficulties which arise from improper shelter, and an equable temperature under canvas in all seasons of the year, as well as the difficulties that arise from wind, dust, flies, etc., all combined to preclude aseptic work, under field conditions. When the wounded finally reach the field hospitals where facilities for abdominal work are to be found, the time for safety in operation has gone by, and if it has not, the surgeons are so occupied in doing necessary work on a great number of other wounded that common justice to the greater number does not permit the employment of a large operating staff, with the necessary time and personnel, to be detached to do abdominal work on a comparatively few wounded.

Indications for Operation.—(1) Protrusion of the intestine from the wound soiled by dirt and feces, when the patient's condition permits, demands immediate operation, even though the surroundings are not entirely satisfactory.

(2) When the symptoms indicate that internal hemorrhage is going on, the chance of saving life by laparotomy and the ligation of bleeding vessels should be undertaken, though the environments are precarious.

(3) When a bullet has crossed the intestinal area, if the time after the injury and the environments permit, laparotomy should be done promptly.

The reports from the western, front especially where capable operators have established well-equipped operating centers near the fighting line, would indicate that the marked difference between civil and military practice which bears on the subject of environment and surgical talent, is to a great extent obliterated and the consequence is that the results in military practice are to a certain extent simulating those in civil practice. In civil practice capable surgeons who command the environments, when the condition of the patient permits, never hesitate to open the abdomen with a view to exploration, and operation when necessary. Operators like Guerry(b1) in this country have published some remarkable results. In 27 cases operated upon there were but 2 deaths. The youngest case was 7 years of age; the lapse of time from the shooting to the time of operation was 8-9 hours; the earliest case operated on was 3 hours, the latest 36 hours after injury. The smallest number of perforations was 2, the largest, 22. The abstract makes no mention of the nature of the projectiles, their calibers or velocities, points of vital import in military cases. In civil life many of the cases reported are from small calibers with low velocities, and these when operated upon early by expert surgeons nearly all get well, because the lesion which these projectiles inflict are readily dealt with.

There is quite a divergence of opinion as to the operative results by different operators in civil practice in this country. We are informed by Dr. Rudolph Matas(c1), of Charity Hospital, New Orleans, that the results in recent years in that hospital are not better than those before the operative treatment first came in vogue in 1887, which under quiet and opium gave a mortality of 59 per cent. He gives statistics of mortality in different groups of operated cases which run from 68 to 77 per cent., and he states that since 1905 the operative treatment seems to grow less and less in favor. In considering the reason for this change, we should remember that there have been marked advances in the manufacture of pistols and revolvers which are used in civil life and that these changes are especially seen in the increase of calibres and velocities, the latter being the result of the employment of smokeless powder. The velocities have been as much as trebled in the last few years and the mechanical effects of this change has resulted in increasing the severity of the wounds by adding instability to the already illy balanced short bullets, which makes them travel end over end with greater speed.

In the Congress of Military Surgeons at Brussels last spring, Korte, Schneiden, Kraske, Rehn, Sauerbruch and Hanken all advocated early operation within the first 12 hours. Kraske reports that out of 14 cases recently operated upon there were 6 recoveries, and it is his belief that all cases of intestinal injury die if not treated by operation. Sauerbruch operated on 54 cases, with 23 recoveries.

Enderlen(d1) and Sauerbruch advocated early operation. In 227 cases operated upon, 211 showed intestinal injury. In 52 cases of intestinal wounds treated conservatively, 46 died in the field hospital, 3 died later, and but 4 made complete recoveries. Of the 211 cases operated upon for intestinal lesion the mortality was 44.4 per cent. A mistaken diagnosis occurred eight times; none of the patients were injured by operation. The patients were generally kept quiet four weeks before transportation was undertaken.

Tuffier, in his observations during the first five months of the war, states that a number of his confrères have reached the conclusion that some of the abdominal wounds heal spontaneously even with a stercoraceous fistula and they are generally wounds of the large intestine. Hemoperitoneum heals after incision or laparotomy, but more often spontaneously. Commenting on the value of laparotomy for wounds of the small intestine, he states that there then existed not more than twenty cures in the French army. This was at a time when the transportation facilities were not the best. He states that wounds of the liver and spleen are complicated by hemoperitoneum which may recover. Wounds of the gall-bladder are followed by fistula, which is spontaneously curable.

We confidently believe that the experience in the world war will give us definite data on many mooted points in abdominal wounds by gunshot. We have to admit that the lesions are often different to those in civil life, and that in spite of the advances that have been made in field surgery to bring the environments under better control, safety in operation in war surgery will never be as promising as it is in civil hospitals, and that the results of operated cases can never be as favorable.

Gunshot Injuries of Joints.—So long as the large majority of war wounds were the results of the ogival headed, steel-jacketed bullet, the field surgeons had cause to congratulate themselves over the humane features of the majority of joint wounds. The introduction of the pointed, unstable bullet, and the increase in casualties from the field artillery arm, has again added to the severity of these wounds. In the Spanish-American, Anglo-Boer and Russo-Japanese wars the observers were generally agreed upon the happy results of the majority of joint wounds. The lesion in the epipyses generally consisted of a clean-cut perforation, and except in cases of lodged missiles in the joint proper, the measures of treatment consisted in a clean dressing and prompt fixation, and the results were so satisfactory that the majority of the wounded were restored to the colors in a few months. Of 17 cases of

gunshots of the knee observed in the Santiago campaign by reduced caliber bullets (La Garde, op. cit), there were neither deaths nor amputations and 81.1 per cent. were restored to duty. Fallenfant reported 1,382 gunshot injuries of all joints from the Manchurian campaign, with but 7 deaths and 72 resections. The latter were the result of shell fire.

Tuffier(d1) observes that gunshots of the knee by rifle bullets generally heal kindly, but those from shrapnel and shell fragments undergo suppuration and end in ankylosis after months of convalescence. He prefers resection of the knee to amputation and he bases his preference on the fact that 10 per cent. of amputations of the thigh have to suffer re-amputation or other secondary operations about the stump. We believe with Tuffier, who seems to voice the opinion of military surgeons generally that the great surgical question at present is dealing with wounds of the limbs complicated by fractures and wounds of joints. An articular wound without reaction is dressed and immobilized. In the case of loose fragments of bone in the larger joints especially the knee or elbow, arthrotomy is necessary. Through and through drainage is the rule in the presence of infection. When symptoms of suppuration fail to yield, excision or amputation is in order.

Gunshot fracture of long bones in the lower extremities in this as well as all wars are more serious and recover slower than those of the upper limb. Drainage, immobilization and constant redressing are the three prime requisites. Removal of all loose fragments should be practiced at the first dressing or soon thereafter before extensive infection has set in. Plaster of Paris is the favorite apparatus for immobilization in war. Infection in fractures consumes the bulk of the surgeons' attention in this and all wars, since it is universally present in bone injuries. Much progress has been made in dealing with these infections, as we have pointed out in the earlier part of this review, and doubtless our methods of infected wound treatment will have been very much improved after the experience in the present war has been summed up.

Amputation by Circular Plane Section.—G. A. Wright (*Lancet*, p. 810, 1915) states that removal of a limb by this method has been sanctioned in certain cases of gas gangrene for the following reasons: (1) That the wound is quite open; (2) that where there is great prostration it is the quickest and easiest way of severing the part; (3) that this is a temporary measure, that everything can be put to rights later.

This is a method of antiquity and it was only resorted to in the beginning of the great war, when there was insufficient personnel during the great battles in the open, in Belgium and Northern France.

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(a) English Infantry Bullets and their action by Prof. Dr. K. Stargardt. J. R. A. M. C. June 1915.
(b) Remarks on the action of the Regular Infantry Bullets and of the Dum Dum Bullets, etc., by Professor Kirschener, and conclusion by Col. Retcher. R. A. M. C. June 1915.
(c) Brit. z. Klin. 1915, XCVI, 7.
(d) LaGarde, Louis A. Gunshot Injuries. Wm. Wood & Company 1914.
(e) Stewart, Edward White and Chas. Newton in "Arms and Man" June 1, 1911.
(f) African Game Trails, by Theodore Roosevelt.
(g) *Lancet*, June 12, 1915.
(h) *Surg. Gyn.* and *Obst.* 1915, XX, pp. 708-710.
(i) Hunterian Oration before College of Surgeons of England by Sir W. Watson Cheyne. *Lancet*, Feb. 27, 1915.
(j) Mutter Lecture by Louis A. LaGarde, 1901, *Jour. A. M. A.*, April 11-18, 1903.
(k) Wound Infections. Some new methods for the Study, etc. *Lancet*, April 10, 1915.
(l) Infection of Gunshot Wounds, by Louis A. LaGarde, M.C., U. S. A. *Surg., Gyn.* and *Obst.* Sept. 15, 1915.
(m) *Lancet*, Nov. 6, 1915.
(n) *Brit. Jour. Surg.*, July, 1915, p. 106.
(o) *Surg., Gyn.* and *Obst.*, Nov., 1915.
(p) Russo-Japanese war. Medical and Surgical Reports of Lt.-Col. W. G. McPherson, R. A. M. C.
(q) *Brit. Med. Jour.*, June 26, 1915; *J. A. M. A.*, 1915, LXV., 463.
(r) Wright, Sir A. E., *Lancet*, Nov. 6, 1915, p. 1012.
(s) H. M. W. Gray. Treatment of Gunshot Wounds and Primary Suture. *Brit. Med. Jour.*, 1915, II., p. 317.
(t) (Chirurgie der Gefasse Aneurysmen). *Beitr. z. Klin. Chir.*, 1915, XCXI., 556.
(u) A. Ritschl, *Med. Wchuschr.*, 1915, XLI., 132
(v) *Brit. Med. Jour.*, Oct. 2, 1915, p. 498.
(w) Surgical Experiences in the Boer war. By Makins.
(x) Le Traitment des blessures des nerfs par projectiles, etc. *Bull. de l'Acad. de Med.*, Paris; 3rd Serie; Tome LXXIII., p. 186.
(y) *Surg., Gyn.* and *Obst.*, Oct., 1915, p. 40.
(z) Pathology and Treatment of Haemothorax, *Surg., Gyn.* and *Obst.*, Dec., 1915, p. 624.
(a1) *Surg., Gyn.* and *Obst.*, Nov., 1915, p. 522.
(b1) *Surg., Gyn.* and *Obst.*, Nov., 1915, p. 523.
(c1) Gunshot Injuries. By Louis A. LaGarde. Wm. Wood & Co., 1914.
(d1) Die Operative Behandlung der Darmschusse im Kriege. *Med. Klin.*, Berl., 1915, XI., 823.
(d1) *Bull. L'Acad. de Med.*, Paris, 1915, No. 23.

COMMENTS ON THE PROGRESS OF SURGERY DURING THE YEAR 1915.

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Surgery not only reflects the scientific but also the social status of its period; and in reviewing the surgical progress of the past year the one great fact which stands in bold relief is the great European war. Its impress is felt mightily not only in the development of military surgery—the surgery of the camp and trench—but in a negative way, in the abandonment of that profound scientific research which only peace can foster. A prodigious amount of human energy has been diverted from the laboratory to the field, from the study to the trench; and so the line of progress for the year is in the direction of the sporadic rather than the permanent. A contemplation of the great laboratory problems has been for a time interrupted by the problems of wound disinfection, plastic operations, antitoxic sera, the conservation of functionating limbs. Thus while out of the war's grist much that is valuable and something permanent may accrue, yet this social cataclysm must divert and redistribute our intellectual forces so that many problems burning for solution must for the time remain quiescent.

Surgery, like civilization in its higher development, must mark time till the toxemia of war burns itself out.

While medical literature has not noticeably decreased in volume, the quality of the product is not particularly distinguished. There are no epoch making contributions to be recorded.

Cancer: The systematic investigation of the cancer problem nourished and stimulated by numerous research funds is well organized on a solid basis of efficiency, and the cause of cancer is today the medical problem upon which the best intellectual efforts are concentrating, but we have been heartened durin the year by no suggestion that its final solution is at hand.

There have been a few promising though vague gleams which promptly vanished into the darkness, and in one instance the premature announcement of a "cure" was the forerunner of a professional fiasco.

Radium takes its place with the *x*-ray in the therapy of cancer, they both cure superficial cancer—neither will influence carcinoma of the deeper structures except perhaps to hasten the proliferation.

There is very positive opinion that while we eagerly await the discovery of the cause of cancer, the profession can do more than mark time (Campbell, MEDICAL TIMES, July, 1915)—that while surgery has reached its limits and that nothing more is to be hoped for in the development or the extension of the operative procedures that are now used for the cure of cancer—yet

the operative results can be measurably improved by getting the co-operation of the patient, so that the cancer patient will submit himself early enough to obtain a cure, and this is to be secured by a campaign of public education.

While the public are daily put in possession of new cures for cancer which stand condemned on the face of them, they remain in ignorance or fear of the only reliable cure which can be offered. The public have been fed on fallacies; what the public needs is facts and when the facts are forthcoming the public will not be slow to appropriate and apply them in cancer as they have in tuberculosis.

Surgeons everywhere feel the urgent necessity of a widespread accurate knowledge regarding the simple facts of cancer; they believe that the public can be put in possession of a few reliable facts which if intelligently utilized would save useful lives and alleviate untold sufferings. There are intimations that a very earnest effort is being launched to make such a campaign of public education effective.

Anaesthesia: Bevan (*Jour. A. M. A.*, Vol. LXV, No. 17) in an illuminating article presents a scholarly and judicious review of some fourteen methods of anaesthesia, analysing them from the standpoint of safety, comfort, efficiency, control, simplicity, after effects, and complications.

His conclusions with one or two exceptions represent with fair accuracy the consensus of opinion of American operators. First: "Ether by the open drop method is the safest general anaesthetic known for producing prolonged anaesthesia. It should be to-day the standard anaesthetic in the surgical clinic. Second: "Gas should be one of the general anaesthetics employed in the surgical clinic. Its place should be for short anaesthesias in which unconsciousness is desired and local anaestheeia is not applicable—in reducing fractures and dislocations, opening abcesses, and in some more prolonged operations in which for special reasons gas becomes safer than ether, such as operations on the urinary organs with kidney insufficiency. A surgical clinic which does not frequently employ gas anaesthesia is, from the standpoint of anaesthetics a poorly conducted clinic." Third: Such passing fads as intravenous anaesthesia and intrarectal anaesthesia should be rejected as too dangerous and too complicated, with no special advantages. Intrarectal anaesthesia is an "old method introduced as early as 1847 and revived from time to time —its very severe local irritation of the colon with collicky pains and bloody diarrhoea has often proved fatal."

The Shockless Operation: The teachings of Crile have received a good deal of consideration during the past year, they have provoked a salutary debate. His fascinating theory of shock has won many ardent disciples. Many physiologists, however, have repeated Crile's experimental work, and not all accept his theory or results. However, those who accept Crile's dictum that shock can be prevented by "sequestering the brain from the field of operation by blocking the nerves with novocaine" are enthusiastic with the results. (Campbell, *New York Medical Journal*, Feb. 13, 1915). They believe that Crile has not only placed the cause and prevention of shock upon a rational basis but that he has demonstrated the integration of the nervous system and shown that shock is not a condition associated with traumatism only, but that it may be produced by divers causes, such as fear and worry, physical injury, infection, hemorrhage, excessive muscular exertion, starvation and insomnia; and the climax of Crile's work is not in the fact that he has definitely classified surgical shock, but that he has placed shock upon such a broad scientific basis that surgical shock is found to be but one of the incidents of this phenomenon in the broad gamut of life's exigencies. Another important observation of Crile on the "Influence of Anaesthesia on Acidity of the Blood" (*Annals of Surgery*, 1915, LXI) that must modify our anaesthesia methods, is his statement that "Anaesthesia and many instances of unconsciousness are merely phenomena of acidity."

"Whereas the blood in both man and animals under normal conditions is slightly alkaline or potentially alkaline; at the time of death, whatever its cause, the potential or actual alkalinity decreases and the blood becomes actually neutral or acid." The inference being made that acidity of itself may be the actual final cause of death.

Another striking observation is that not only acidity of the blood is increased by inhalation anaesthesia, but that the production of acidity is the method by which anaesthesia itself is produced. Now if the state of anaesthesia is due to an induced acidity of the blood, then many clinical phenomena are not only explained by this theory but serve to substantiate it. Such as the precipitation of acidosis after general anaestesia; the reason for the use of intravenous infusion of bicarbonate of soda: the great thirst after inhalation anaesthesia —water like air neutralizes acids.

On the other hand narcotization with morphine, however deep, produces no acidity, the normal potential alkalinity of the blood is not disturbed. Bearing in mind these impressive facts we venture the observation that there are a number of operations which as a matter of thoughtless routine are now being performed under general anaesthesia which can and ought to be performed under local anaesthesia with preliminary morphine narcotization, because of the greater safety to the patient.

Skin Disinfection: The iodine vogue in skin disinfection though fairly efficient is by no means ideal. It stains the skin, it irritates the skin, it loses its germicidal properties in the presence of blood, it is too irritating to be a hand dsinfectant and is thus not generally applicable in the operating room. Besides, it is always necessary to protect peritoneal surfaces from coming in contact with iodinized skin.

McDonald in an article on "Disinfection of the Hands and Abdominal Skin before operation" (*Surgery, Gynecology and Obstetrics*, 1915, XXI, 82) presents a method which on account if its simplicity, efficiency and cheapness will undoubtedly supplant the idodine method. McDonald suggests the use of a pyxol solution which has the following composition: acetone (commercial) 40 parts; denatured alcohol, 60 parts; pyxol, 2 parts. Pyxol is extracted from coal-tar creosote. Its germicidal efficiency is twenty times that of phenol. The action of pyxol is not impaired by pus, soap, serum or other albuminous matter, and it does not irritate the skin. The hands are disinfected by immersion in this solution for one minute with the aid of nail brush and gauze sponge. In disinfecting the skin over field of operation, the solution is rubbed on for two minutes before operation after the patient is under ether without any preliminary washing. The author states that since using this solution he has had better wounds and more rapid healing with skin free from all evidence of chemical irritation. The value of the article is enhanced and the claims substantiated by the bacteriological report of Dr. Frederick E. Sondern.

Transfusion: (*Jour. A. M. A.*, 1915, LXV, 1368). The subject of transfusion has received some attention and a few notable contributions to its technique. The devices in successful use are numerous, but however perfect, they cannot do away with the need of accurate technique.

Among the devices which have been used successfully are the glass bulb of Curtis and David, the cylinder of Kimpton and Brown, and the syringe sets of Lindeman. The new combined direct and indirect method of Miller gives much promise. Whatever device is used every surgeon should master one good technique, for when transfusion is needed it cannot always await the attendance of a specially trained technician.

The search for harmless anticoagulants has apparently been realized in the suggestion of Hogan who advocates the "Intravenous use of Colloidal (Gelatine) Solutions in Shock" (*Jour. A. M. A.*, 1915, LXIV, 721). The author had been seeking a substance which shall replace whole blood and sera in profusion. Ascites fluid and hydrocele fluid represent animal colloidal solutions, but there might be danger from their use. The gelatine solution of Hogan is made from purest gelatine 25 gm. sodium chloride 1.5 gm. and 100 cc. distilled water. The whole is boiled for fifteen minutes, filtered, and placed in an autoclave at considerably more than boiling point for one hour, after which it is chilled in a refrigerator. The author cites cases in which badly shocked patients received 500-750 cc. of this solution with the greatest benefit. In fact, in these cases all the ordinary measures had failed. This measure appears to be of the greatest value in all forms of shock save perhaps when the low blood pressure depends upon heart failure due to sepsis.

Military Surgery: There are scores of articles written by military surgeons, but a large proportion are devoted to a discussion either of tetanus or wound disinfection. The most valuable contributions are yet to be made, after the war is over and the overworked medical corps have time to correlate their observations and sift the chaff from that which is of permanent value.

Among many articles written on tetanus in the European war, one of the few to indicate real progress is contributed by Pribram "Clinical and Theapeutic Experiences with Tetanus" (*Berlin Klin. Wochenschrift*, 1915, LII, 865). The author observes first that there is a strong disposition to develop tetanus in conjunction with the status lymphaticus—and this fact also governs the prognosis. Second: That early pain in the epigastrium suggests a severe if not fatal outcome, because it is due to early contraction of the diaphragm, a condition which is very prone to go from bad to worse and is little influenced by treatment.

Regarding the treatment of wounds of the war Tuffier and Sir A. Wright ("Treatment of Wounds of the War", *Lancet*, 1915, II, 932.) agree that these wounds cannot be disinfected by ordinary germicides. They commend Dakin's hypochlorite of sodium dressing with immobilization as a transport dressing until the wound can be thoroughly disinfected by mechanical and surgical means. With the hypochlorite dressing neither suppuration, odor, or temperature develops. Tuffier has seen better results in severe injuries such as those involving the joints than he has ever witnessed in peace times.

Franke makes a real contribution to *the treatment of pyocyaneus infections* ("Airol in Pyocyaneus Infection"—*Muench. Med. Wochenschrift*, 1915, LXII, 1007). He commends the use of an iodin-bismuth compound, introduced many years ago as a substitute for iodoform. He claims that it is a specific for blue pus suppurations and recommends its use in the present war in which blue pus is very common—as high as 50% of infected wounds. It should not be dusted on but used in thick suspension. The author obtained striking results in the military hospitals.

Two brilliant cases of "Cardiac Surgery at the Front" (*Münch, Med. Wochenscrift*, 1915, LXII, 647) are reported by Schäfer. The majority of surgeons would hardly favor operative cardiac surgery in field hospitals, largely because skilled assistants are not available. The author, however, operated twice successfully aided only by the sisters. The first subject was a powerful man and a heavy drinker who attempted suicide with a kitchen knife. He was promptly submitted to cardiac and pericardial suture. He was discharged in thirty-two days and is now fighting at the front. The second patient, a high school boy then in the ranks, received a bullet wound involving the lung, pericardium and heart. At operation there was little blood in the pericardial sac. The wound in the left ventricle was first closed; the heart was then rotated and the counter opening sutured. The other perforated structures were sutured in turn and the costal flap replaced. The bullet which lay under the skin of the back was removed. The boy made a complete recovery, but sometime after his transport to Berlin he required a second operation for abscess of the lung. He is now fully recovered.

A very ingenious and successful *urethroplasty with an appendical graft* should be mentioned here, for while this procedure originated with Lexer in 1911, we do not know that anyone previous to the author has been successful with a heteroplastic graft. (Rothchild *Deutsche Med. Wochenschrift*, 1915, XLI, 674).

The procedure was tested on a soldier who was shot in the buttock, after which urine came away from the exit wound in the thigh. A tight traumatic stricture formed in the urethra. At this juncture another soldier was operated and a fairly healthy appendix removed. A portion of the first patient's urethra was excised and a prepared section of appendix sutured in place as a substitute. The patient was supervised for sixty days and was doing well under daily sounding.

The chief feature of the case is the fact that the author made a successful graft with the appendix of another patient—a result usually thuoght impossible. Von Angerer got a good result with an autograft in 1913.

Bone-Grafts: There is increasing interest in the surgery of the bones and joints. There are numerous articles dealing with arthroplasties and bone grafts, but little that is new. We note that the field in which bone transplants are used is constantly broadening.

Müller ("Sternal Transplants in Cranial Defects." *Centralbl. par Chirurgie*, 1915, XLII, 409) operated on two cases of cranial defect by transplanting portions of the sternum. The disk of bone but a few millimeters in thickness can be made to conform to the curvature of the skull. The thin disk heals firmly in postion within a month.

Trout advises tibial transplant from father to child in spina bifida (*Surgery, Gynecology and Obstetrics*, 1915, XX, 523.) The sac was closed with suture and thrust back in the canal. A thin disk of bone was obtained from the father's tibia and anchored to the opening with sutures. The result was as nearly perfect as possible.

Oehlecker suggests the substitution of bone for exentrated eyeballs (*Centralblatt fur Chirurgie*, 1915, XLII, 425.)

The author says that it is an easy matter in military surgery to transplant the head of a metatarsal or metacarpal bone into the hollow left after exenteration of the bulb. This prevents sinking in of the eyelid. The new substance heals in without reaction, is not in anyway changed and moves like a normal bulb.

The Thorax: Two notable contributions have been made to the surgery of the thorax, both by American authors.

Lilienthal discusses a "New Surgical Management of Acute Empyema" (*Annals of Surgery*, 1915, LXI, 309). The author holds the view that a blind incision into the acute empyemal sac with resection of one or more ribs is unsurgical, to say nothing of the very high average mortality and frequent necessity for further intervention. He advocates instead an exploratory thoracotomy, using wide rib retractors for the purpose of locating the possible causes of the empyema or isolated sacculations. The lung is now mobilized in a manner practically identical with decortication for chronic empyema. There is no resection of ribs and no attempt to draw together the spread ribs, the space being used for drainage. The author has operated twenty-three times and lost four patients, a mortality of seventeen per cent.

One of the great advances of the present surgical year is reported by Torek in his "Operative Treatment of Carcinoma of the Esophagus" (*Annals of Surgery*, 1915, LXI, 385). In this paper the author reports a cure of cancer of the cervical esophagus by transpleural resection. The operation involves a gastrostomy for nourishing the patient, a flap operation just above the manubrium for extracting the esophagus after it has been mobilized through the transpleural incision. After resection of the esophagus the patient is left with a cervical fistula.

In the author's case the growth was strictly localized and readily operable. At last accounts there had been no recurrence.

The Gastrointestinal Tract: The most important advance in this field is found through the increasing knowledge of its physiology. We are beginning to appreciate the integration of the gastrointestinal canal —that it is a series of tubes of varying caliber with occasional sacculations, all interrelated and connected by an intra-alimentary system of reflexes which give to pathological foci a large area over which to express their symptomatology.

Barclay has made an excellent contribution in his explotation of the ileo-pyloric reflex ("The Alimentary Tract," London and Manchester, 1915). "In cases of duodenal irritation the stomach commences to empty rapidly, but in some instances this continues only a short time (half to three-quarters of an hour) and then ceases, so that the stomach presents radiographically a retention of contents similar to that observed in pyloric obstruction. In such cases the cessation of the passage of food through the pylorus and of general activity in the stomach coincides with the appearance of heavy shadows in the terminal portion of the ileum. There is no doubt therefore that in this comparatively short time contents have passed along the whole length of the small intestine. As pressure externally applied, will no longer cause food to pass through the pylorus, Barclay suggests that reflex closure of the stomach exit has taken place in consequence of a stimulus originated from the mucosa of the distal portion of the ileum, and that this phenomenon affords yet another instance of the intra-alimentary system of reflexes. If after a time more food is given, the ileocecal sphincter relaxes and permits the passage of ileal contents into the large bowel. This is simply a specific instance of the general truth that the giving or even the smelling of food induces emptying of the ileum into the colon." (Todd).

Deaver recently made the statement that the pancreas was rapidly usurping the old place of the appendix —medical literature for the past year does not coincide with this assertion. There are no notable contributions to the surgery of the pancreas, the really distinct advances are associated with the stomch and bile-ducts.

McKenna in an article on "Intragastric Adhesions" (*Surgery, Gynecology and Obstetrics*, 1915, XX, 455) is probably the first to report a case of this kind, but he believes that such conditions occasionally occur and give rise to erroneous x-ray findings.

The patient had an indurated saddle ulcer on the cardiac extremity of the lesser curvature, not sufficient to cause the hour-glass stomach shown by the shadowgraph. In operating it was found that within the stomach an adhesion described as a "tongue of mucous membrane" passed from the ulcer to the greater curvature.

While not advising routine gastrotomies the author believes this possibility should be kept in mind and that similar conditions will be encountered from time to time.

Campbell (Benign Tumors of the Stomach—*Surgery, Gynecology and Obstetrics*, 1915, XX, 66) believes that the distinction is his of being the first surgeon to remove a benign papilloma of the stomach after correct preoperative diagnosis.

The diagnosis long in suspense was finally made by the pathologist who had been examining the blood, gastric contents and feces. A gastrotomy was performed and a pedunculated growth found on the posterior wall. The stump was cauterized and the incision closed. There was no recurrence when last seen nine months later.

Walton describes a new and ingenious operation "The Reconstruction of the Common Bile Duct" (*Surgery, Gynecology and Obstetrics*, 1915, XX, 269) which he claims is a simple and satisfactory method of meeting a most difficult problem.

In a case in which the common duct had been quite obliterated at a distance below the bifurcation; this part of the duct was excised, and a flap taken from the duodenum large enough to make an artificial duct was turned downward. A short rubber tube was temporarily sutured to the stump of the duct and the duodenal flap brought up and sutured about it.

The operation was a success and in about ten days the rubber tube came away by the rectum. The success was due to the complete suturing which prevented any leakage of bile.

Among the brilliant and bold procedures is reported for the first time a case of "Aortic Embolectomy" by Stewart (*Annals of Surgery*, 1915, LXI, 526).

The patient really never had a chance of recovery and succumbed on the third day. She was an elderly woman admitted to the hospital for gangrene of the right leg, accompanied or preceded by other emboli more centrally seated, as shown by beginning gangrene of the opposite leg. The diagnosis was changed later to embolism of the bifurcation of the aorta with secondary thrombosis.

It was decided to open the aorta and remove the clot.

The vessel was clamped with the fingers, and an incision made through which soft clots and a firm embolus were removed. The aortic incision was subsequently closed with sutures. Technically the operation was a success, but death resulted from cardiac failure.

The treatment of obstinate trifacial neuralgia receives renewed attention in two articles which advocate the injection of alcohol into the gasserian ganglion itself.

Byrnes (*Bull. of the John Hopkins Hospital*, 1915, XXVI, I.) has performed this operation with success in fourteen cases.

Hirschel (*Münch, Med. Wochenscrift*, 1915, LXII, I) has had excellent results in seven cases which were of long standing and had proved refractory to other methods of treatment.

The canula is passed submucously along the cheek, the first puncture being opposite the second molar tooth. The index finger of the unused hand is used as a guide until the tip of the canula has entered the foramen ovale. A few drops of novocain solution is first injected then one-half to one cm. of alcohol drop by drop.

Summary: To summarize surgical progress for the year 1915 it seems fair to say that the main activity has been in the direction of general operative technique —by this is meant improved methods of anesthesia; the shockless operation; more perfect methods of skin disinfection; improvements in the technique of transfusion which includes more perfect devices and the discovery of harmless anticoagulants; there is also to be noted increased interest in the surgery of bones and joints—especially bone grafts; increased interest in the surgery of the thorax; and an earnest effort by a campaign of public education to bring the cancer victims to earlier operation.

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PROGRESS OF OPHTHALMOLOGY DURING THE YEAR 1915.

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Very little in the way of marked advances has been made during the last year in the realm of ophthalmology. Much of the scientific and pathologic advances in this branch of medicine has come from our German confreres across the water, and as their time is so busily occupied with the great European conflict their writings and experimental work has by no means been so prolific. This is equally true of English, French, Italian and Russians. The foreign medical periodicals have contained numerous articles dealing with injuries to the eyes especially from the standpoint of the war, but since we hope Americans will never be called upon to treat such injuries as a result of national conflict, these reports must necessarily be of more interest abroad than at home.

Several new diagnostic instruments have been devised, most of which are but modifications of those already in general use. Among these must be mentioned the various electric ophthalmoscopes.

The question of the vaccine therapy in certain inflammatory diseases of the eye has received some attention but less perhaps than the year previous. The fact that many obscure inflammatory conditions of the sclera and cornea are of a tuberculous character has led to a more extended use of tuberculin.

A number of well written and timely articles have appeared on the subject of ophthalmia in the new born. More attention is given to the importance of disseminating facts on this subject both among the physicians at large and among the public in general. The work of the Committee on Conservation of Vision of the A. M. A. is largely responsible for the enthusiastic dissemination of this knowledge throughout all the states by the system of lectures, instituted by the various state chairmen.

Crede's method is still extolled as the best prophylactic measurer. In the treatment of this condition nothing new has been added except perhaps the attention which has been directed to the use of serum in gonococcus conjunctivitis. In reporting 32 cases treated by this method Offret concludes with the following sentence: "but for the present it should be used in conjunction with the classical treatment of irrigation and silver salts."

Nothing new has been added to the subject of sympathetic ophthalmia. There is still a great diversity of opinion as to its real cause. Its treatment by the use of salvarsan and neosalvarsan has gained popularity during the last year. This is purely empirical and yet anything is of value which adds something to the curative effect of a procedure in this insiduous disease. The reviewers objection to the use of this remedy is the possibility of nerve deafness following its injection. We still believe that there is a possibility of a poisonous effect following the use of this remedy.

The subject of glaucoma is still a fruitful theme for discussion. The pathology of this disease has not yet been solved but is a broad field for experimentation. Numerous cases of late infection following the trephine operation have been reported which demonstrates that this is far from being the ideal operation. On Nov. 15, 1915, the writer had the pleasure of demonstrating at the Illinois Charitable Eye and Ear Infirmary before the Chicago ophthalmologists the operation of iridotasis. In the evening he read a paper on the same subject which was fully discussed by the members present and which brought forth many ideas pro and con.

The question of the intra-capsular removal of the crystalline lense in cataract operations has received much attention from the various writers. It is the concensus of opinion that this operation is one of choice if the operator has had any extensive experience and has a large operative clinic. Otherwise the large majority of operators are better off by adhering to the older methods.

Numerous cases of eye injuries have been reported during the last year, and these have consisted of all varieties. The fact that factories are taking more precaution in protecting their workmen from various accidents has somewhat minimized such occurrences. The importance of x-ray localization shows the importance of this diagnostic procedure.

Grand Opera House.

Therapeutic Drama.

A certain earnest gentleman, Mr. S. F. Austin, has written a paper called "Dramatizing Psychotherapeutics," in which he proposes that plays be used to exert therapeutic effects upon audiences, through suggestion. He thinks that many minor illnesses would respond well to plays constructed with this idea in view. This idea, carried into effect, would add another kind of play to the two which seem to make up most of our dramas at the present time—those which make one sick and those which one would have to be already sick to want to see.

Ninety per cent. of tubercular infections, among women, in the kidney are limited to one kidney.

SOME OF THE ADVANCES IN OBSTETRICS AND GYNECOLOGY FOR 1915.

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The progress made in obstretrics and gynecology for 1915 has been largely clinical, as relatively little has been done in laboratory studies. Owing to the European war, many of the valuable contributions to gynecological and obstetrical pathology, which have formerly emanated from German, French and Russian sources, have not reached America.

The campaign for the early diagnosis of cancer has been continued, but the increase in the percentage of operable cases has been comparatively small. There is a tendency for surgeons to revert to less radical procedures, particularly vaginal hysterectomy with the electric cautery clamp. The principle of Percy seems to have been generally accepted, namely that the knife spreads the disease through the lymphatics, while heat kills the cancer cell, and seals the avenues of extension. It is in the treatment of advanced cases in which the most progress has been made. Clark of New Orleans, and Cobb of Boston, have practiced tying both ovarians and the internal iliac arteries, and find this ligation to be a valuable means of diminishing the pain and controlling the hemorrhage, especially when the ligation is combined with the Percy dessication method with the cautery. Since the proper application of the Percy treatment requires that the abdomen be opened, a large percentage of the so-called inoperable cases may be attacked, by either a radical or an extensive palliative procedure, for it has been shown that the fixation of the uterus and indurated masses in the pelvis are frequently due to inflammatory exudates and not to the extension of the cancerous processes. Exploratory laparotomy settles this question, and the writer has come to the belief that each of these cases, however far advanced, should be given the chance of ligation and cauterization, for by the early and effective control of the hemorrhage, the length of life of the individual is definitely increased. Radium has not had as enthusiastic support as was expected for it from the early reports. Aunspach states that radium must be reserved for those cases of cancer for which removal by operation is out of the question. That radium will cure an undetermined percentage of inoperable cases, and give to the stricken people formerly condemned to die, a new hope, seems certain, but the exact economic value of this is not known, neither is it known in which particular case the radium will act favorably. The therapeutic effect of radium is probably identical to the effect of the *x*-ray, except that the radium can be placed directly in contact with the diseased tissue. It should be used in massive doses, and the patient must be kept under observation until the local and subjective symptoms produced by the radium have disappeared.

All in all, there is little which is new to contribute on the subject of cancer. McGlynn states that two facts stand out as undisputed, first that there is always a precancerous stage, and second that in the beginning cancer is a local disease. Hence, we are still striving to make an early diagnosis, for we know that the early removal, especially with the cautery, sealing the lymphatic channels of extension, offers the only hope for permanent cure.

Much has been done in the treatment of hemorrhage from the uterus by the roentgenologists. Pfahler gives the following indication for the treatment of hemorrhages due to myomata as well as from those uteri in which no determinable nodulation can be found; the *x*-ray should be employed and will control hemorrhage in all cases of myomata in older women in whom there is already well advanced anemia, which may be the cause of an anemic heart; in all elderly or young women in whom there is a marked organic heart disease, diabetes mellitus, chronic nephritis, marked lung disease, and goitre with acute symptoms; or in a patient beyond the age of forty, in whom there is no contraindication. In general, the older the patient and the nearer she has approached the menopause, the more satisfactory are the results from the *x*-ray. Under forty it is not the treatment of choice.

Definite contraindications to its use are admitted by Pfahler in his summary. It is contraindicated in all cases in which the tumor is pedunculated, or in which the tumor can be destroyed without destroying the reproductive powers of the patient; in fibroids that have undergone malignant degeneration or have become gangrenous; in tumors associated with diseases of the adnexa; in fibroids which are producing such marked symptoms that the life of the patient is endangered by waiting two or three months for the effects of the *x*-ray treatment. He claims that hemorrhage may be controlled in every properly selected case, and that 75 per cent. of the tumors have disappeared under roentgen treatment.

Considerable has been written on the fate of the conserved ovary after hysterectomy. While it is generally admitted that the removal of the ovaries in women over forty-five should be the rule, and that they should be conserved in younger women when hysterectomy is done, there seems to be an ever accumulating mass of clinical evidence showing that the conserved ovary has not only its circulation but its innervation interferred with by hysterectomy, and so becomes a disturbing factor. Furthermore, it has not been proven that conservation of the ovary after removal of the uterus maintains the internal secretion and so lessens the menstrual molimena. Vineberg draws the following conclusions with reference to conservation of the ovary after hysterectomy: first, there is considerable uncertainty as to which tissue in the ovary is responsible for the production of the internal secretion; second, while it is established that the follicles go through the various stages of development in the conserved ovary or ovaries after the uterus has been removed it is not at all certain that the function of the internal secretion continues uninfluenced by the great changes in the blood supply, and by the traumatism to which the pelvic sympathetic nerves are subjected as a consequence of operation; third, it is still a disputed point as to what degree the climacteric syndrome is due to the removal of the ovaries and to what degree to the injury to the pelvic nerves incident to the operation; fourth, clinically it has been found that the freedom from the climacteric syndrome in hysterectomized women in whom the ovaries have been conserved is only relative to that which obtains in the same class of women in whom the ovaries have been removed. A generous estimate would be 20 per cent. in favor of the former; fifth, to obtain the benefits claimed by the advocates of conservation, the ovaries should be retained in all ages and not limited to those under 45, as is done by most of them, inasmuch as it has been shown that of the women who suffered most severely from the artificial menopause, 23 per cent. were over 45 years of age; sixth, subsequent disease of the conserved ovary such as cystic degeneration, malignant growth, inflammatory processes leading to ad-

hesions and pain, and calling for a second operation, does occur in some cases, the number no doubt being much larger than would be inferred from the records found in literature; seventh in view of the foregoing conclusions, the writer is of the opinion that the doubtful clinical advantages accruing from the retained ovaries in hysterectomy are more than counterbalanced by the risk to which the patient is subjected from subsequent disease and adhesions of the conserved ovaries. Vineberg would not therefore retain the ovaries in any case of hysterectomy unless he could leave enough of the lower segment of the uterus with its endometrium to insure the function of menstruation, for as he says, the knowledge imparted to the woman that her ovaries have not been removed, has little significance or moral effect when she learns that she will no longer menstruate.

Tuffier in Paris, and Simpson and Chalfont in America, have transplanted the ovaries from one woman to another and in the same woman to maintain the internal secretion from the ovary. Tuffier is definite in his opinion that autografting operations when the uterus or part of the uterus is left in situ are justifiable. In 37 cases seen from one to six years after operation, he finds that 32 have menstruated regularly as a result of the autograft. He claims further that the menstruation does not appear for two or three months after the operation as it takes that time to establish a proper circulation. The grafted ovary does not become enlarged just preceding menstruation and it is curious to know that every time one ovary has been grafted and the other ovary left in the abdomen, the graft never produces menstruation. All observers agree that ovulation without menstruation is altogether useless, so that it can be positively stated that where the uterus is absent ovarian transplantation is of no value. While Tuffier grafts the ovary in the subperitoneal fat or within a fold of the peritoneum, Simpson and Chalfont make their autotransplantation by placing a piece of one ovary or the ovary in the subcutaneous fat of the abdominal wall about two inches inside of the anterior superior spine of the ilium on the right side. This particular location for transplantation was selected for the following reasons: first, in case of infection or gangrene, it could be removed by cutting one or two stitches; second, in case of late pain, the graft could be removed under local anesthetic without the necessity of a laparotomy; third, the blood supply is comparatively good, derived from the superficial and branches of the deep epigastric arteries; fourth, protection is afforded by the anterior superior spine; fifth, if infection of the graft occur, the abdominal wound will not be involved, and it is free from the dangers of intraperitoneal transplantation when there is a possibility that the graft is already infected. Chalfont reviews the literature of transplantation of the ovaries and asserts that certain facts are definitely established: i. e., that homoplastic (from one animal to another of the same species) transplantation is only rarely successful. Autoplastic transplantation for a time at least is usually successful and the onset of the menopause is prevented or delayed, and that even in autoplasticgraft, degeneration is common after a longer or shorter interval. Ovarian tissue was transplanted in 32 patients, 23 of Dr. Simpson's cases and 9 of Dr. Chalfont's. The immediate results show that in spite of the fact that many of the sections were taken from ovaries in intimate contact with pus tubes, in only one case was the graft infected. In that case two grafts were made because infection was expected. In the ultimate results his cases were divided into those in whom one ovary remains in its natural location, into those from whom both ovaries were removed but the uterus remains, and those from the uterus and both ovaries were taken. Comparing their results with 150 patients from whom both ovaries have been removed, they find that the symptoms of the premature menopause were less prominent and the patient had less discomfort when an ovarian graft was made.

The relative advantages of total versus subtotal hysterectomy with special reference to the occurrence of cancer in the cervical stump, has received consideration. Tyler has collected more than 200 cases of malignant degeneration of the retained cervix, following the supracervical removal of the uterus. Hence we must recognize the importance of complete extirpation of the cervix in hysterectomy, which if properly done does not materially shorten the vagina.

The value of dessication in gynecological surgery has been emphasized by W. L. Clark in the treatment of venereal warts, condylomata, pluritis vulvæ, localized epitheleomata and urethral caruncle. He claims that by the use of dessication abnormal tissues may be devitalized rapidly, by a precise and bloodless method, which is applicable to the smallest spot as well as to a growth involving a larger area. The current has anesthetising properties and seals the channels through which metastasis takes place, besides having the advantage that no disfigurement follows its use, as there is an absence of contraction in the cicatricial tissue produced.

The obstetrical advances which are worthy of consideration include a better understanding of the use of pituitary extract as an obstetrical adjunct which has been brought about by increased clinical experience. The dangers of pituitary extract are beginning to be appreciated. Clinical experience limits its indications in obstetrics to secondary inertia when there is no dystocia and the head is low, and the cervix fully dilated, and in third stage inertia after delivery of the placenta. It is extremely dangerous when used haphazardly, as it has considerable effect on the child as well as on the uterine muscles. In the presence of dystocia tetanic pains are common and there are numerous recorded cases of uterine rupture. In 33 cases the effect on the child was as follows: 20 were born in excellent condition; 6 were slightly asphyxiated; 5 extremely asphyxiated; 3 lived but a short time, and 2 were born dead, both of whom were known to be alive before the extract was given. There is something more than coincidence in such results.

Nineteen fifteen has also brought about a more sane employment of anesthesia in obstetrics. While there have been many contributions for and against the employment of morphin and scopolamin and gas and oxygen, clinical experience has definitely deduced certain indications and limitations for the use of both. In properly selected cases where the labor is already established, morphin-scopolamin amnesia has a definite field in relieving the pain incident to the dilatation stage, and it can be asserted positively that its employment in the first stage of labor has no deleterious effect on either mother or child, and that it favors dilatation by augmenting the normal processes, while gas and oxygen, employed with the crescendo of each pain holds a similar relation to the second stage. With these two adjuncts, the obstetrician who is willing to give the care and time to the conduct of his labor case can assure the woman of a painless delivery, in over 90 per cent. of cases. Pubiotomy and Cesarean section are constantly finding wider indications as the life of the child has become a more important factor in the art of obstetrics. Williams reports at length the effect of pubiotomy on

the course of subsequent labors, based on a study of 30 labors, which occurred subsequent to pubiotomy in 20 individuals. Thirteen full term and thirteen premature children were born spontaneously. In more than one-third of the cases, particularly in funnel pelvis, pubiotomy has resulted in an enlargement of the pelvis sufficient to allow spontaneous delivery. Pubiotomy should not be regarded as an elective operation except in funnel pelvis in young women. In contractions of the superior strait the aim should be to differentiate the patients into those requiring Cesarean section at the onset of labor and those in whom a spontaneous outcome may be reasonably expected. Pubiotomy should be employed in the latter only when the failure of the head to engage after a prolonged second stage has demonstrated that the prognosis is erroneous. Pubiotomy does not compete with elective Cesarean section at the onset of the labor but is far safer than conservative section late in the second stage. The great field for pubic section is in moderate degrees of contracted pelvis in patients who have not been seen until late in labor. The presence of definite infection should be a contraindication to division of the pubic bone.

The prophylactic laying of the Gigli saw in breech extractions, using the subcutaneous method of Doderlein, adds greatly to the peace of mind of the operator when the child is large or the pelvis is of the borderline type. With elective Cesarean section, an adequate test of labor and pubiotomy, obstetricians can definitely abandon the induction of premature labor in the treatment of contracted pelvis.

It is with pleasure that the writer notes the change of attitude among many obstetricians and gynecologists in the treatment of febrile abortions. Benthin and Montgomery have joined the conservatists and show that both the morbidity and mortality in incomplete febrile abortions are reduced by allowing nature to expel the uterine contents. Especially is this so in the presence of hemolytic streptococci. It has taken a considerable time to teach the profession that nature in providing a leukocytic wall and small round cell infiltration beneath the decidua does so with the distinct purpose of protecting the organ against the infecting organism and that the wall thus produced is not intended to be broken down by the use of the meddlesome curet and so spread the infection beyond the confines of nature's limitations.

Williams has made an interesting contribution to the study of uncontrollable hemorrhage in certain cases of accidental separation of the placenta. His observations, based on the study of two cases, show that in the severe cases at least the accident is associated with profound disorganization of the uterine muscle, owing to large quantities of blood lying free between the muscle fibres, disassociating them, which explains the failure of the uterus to contract under oxytocic stimulation. If his observations are correct, it puts a more serious phase on the subject of accidental hemorrhage and we must admit that hard and fast rules cannot be laid down for the treatment of premature separation of the placenta. The Dublin method as suggested by Tweedy, which consists in rupturing the membranes, vaginal plugging, the use of repeated small doses of pituitary extract, and craniotomy in the case of a dead child, allowing the uterus to expel its contents, can hardly be admitted a safe teaching for all cases. The writer, whose experience with accidental hemorrhage has been considerable, must agree with Williams in dividing these cases into the mild and severe types. The former may be easily handled by the employment of the Dublin method. The latter, however, demand more radical measures, as the danger is not passed with the delivery of the child through the maternal passages, for the uterus frequently fails to contract and death from atonic hemorrhage may occur, unless radical measures are employed. These should include, tamponade, aortal compression and hysterectomy, especially since we know that intra-muscular hemorrhage actually does occur, Cesarean section should be the operation of choice in the concealed variety, except in the rare cases in which the cervix is fully dilated.

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THE PROGRESS OF OTOLOGY AND RHINOLOGY FOR THE YEAR 1915.

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The great European war has been the absorbing topic of conversation during the year of nineteen fifteen, and it is but natural that the effect of gun-shot wounds of the upper extremities should excite the interest of the specialist in the department of the ear, nose and throat. The observation of Major Sir William Millegan and Major F. H. Westmacott, stationed at the Manchester Royal Infirmary, up to September 20, 1915, gives us very reliable information on gun-shot wounds of the head and neck. During the early period of the war and before the battle of La Marne, the great percentage of wounds were in the lower extremities. After this memorable event and trench work became the *modus operandi,* the injuries were located as a rule in the head, neck and thorax. According to our observers, the wounds of the head and neck were comparatively free from septic infection, due to freedom from contact with clothing, earth, dust, etc. Many wounds communicating with the nose, mouth and pharynx thus were better aeriated and rendered less liable to infection than wounds of the extremities and abdomen. Many projectiles passed directly through the head or face and produced little or no splintering of bone. Deformities from penetrating wounds were seldom observed.

Since infection was so seldom, cleanlines and free drainage, with the rigid rule of non-surgical interference, brought the best results. Superficially imbedded projectiles were removed, providing their removal did not interfere with the integrity of the parts. Hemorrhage of the nose usually controlled by packing.

In comminuted fracture of the nose, the finger of a rubber glove inserted in the nasal fossa and packed with gauze to meet the size required, has been found most satisfactory. Severe injuries of the larynx were rather infrequent. The authors mention a case of left recurrent laryngeal paralysis from a bullet entering the face and lodging near the second cervical vertebrae, injuring in transit fibers of the vagus. The authors dwell upon cases observed with loss of speech, hearing, smell and memory, without a perceptible sign of injury. Such cases may possibly be classed among the neurotics, and may be due to fright, concussion or hysteria. Cases of this character are not infrequent in civil practice. In the army they recover after a few weeks, when in a base hospital far from the battle line, or in natural surroundings. In civil practice, usually after a money indemnity, cases of neuroses soon recover. Regardless of the possibility of simulation, all such cases must be treated as having an actual pathology.

The theory of the action of vaccines and their application has come to be known more universally during the year. Commercial houses are flooding the markets with their products. Most men using vaccines view them as a "hit and miss" remedy. Regardless of the argument that stock vaccines have no place in therapy, they have come to almost universal use in nose and throat diseases. In acute infections of the nasal mucosa and sinuses, either the stock or autogenous vaccines have an uncertain value when administered with the usual therapy of the organs involved. In the preparation of autogenous vaccines, the pus should be secured if possible from the nose or ear by a suction apparatus—the pneumatic otoscope or Brawley's suction apparatus. By so doing the actual organism producing the disease is more positively secured.

The isolation and cultivation of the tubercle bacillus from discharging ears has received some attention, particularly by Cocks and Dwyer (*Journal of Laryngology*, 1915). It has always been difficult to isolate the tubercle bacillus from a discharging ear, even though the patient has at the time a pulmonary tuberculosis. A suppurating ear, according to some writers, can be only of a pyogenic nature in the absence of the tubercle bacilli. Many contend that a suppurating ear in a tubercular patient can be classed as a tubercular discharging ear. The writer is inclined to the latter hypothesis.

Since most infants have pulmonary tuberculosis in a mitigated form, and pulmonary tuberculosis of the adolescent is a chronic disease, it is reasonable to presume that in a large percentage of infants with a discharging ear the tubercle bacilli may be found. Tuberculosis of the middle ear and mastoid process is not an infrequent disease.

A. Logan and J. S. Fraser have contributed the most comprehensive and exhaustive article of the year entitled "Tuberculosis of the Middle Ear Cleft in Children" (*Journal of Laryngology, Rhinology and Otology*, June, 1915).

The following statistics (ibid) are compiled from an examination of 1,797 cases of discharging ears in children.

Number of tuberculous ear under 15 years— 2 per cent.
Number of tuberculous ear under 5 years— 9 per cent.
Number of tuberculous ear under 2 years—27 per cent.
Number of tuberculous ear under 1 year —50 per cent.

In discussing the etiology and route of infection of the above cases, Turner and Fraser make the statement that 88 per cent. with complete histories were bottle-fed infants, and that the milk was non-sterilized cow's milk; bovine infection predominating rather than human, though the authors make no definite statement in this respect, other than referring to the investigations of Michael (*British Medical Journal*, January, 1914). Michael examined (ibid) 72 cases of tubercular glands of the neck, and of this number, 90 per cent., the bovine bacillus was present; all the children were twelve years and under. We have found in the after treatment of tubercular glands of the neck, with positive findings, and in which the wound would be slow to heal, that 5 per cent. scarlet red ointment daily forced into the fistulous opening gave most satisfactory results.

The investigation of Turner and Fraser relative to the onset of the disease, i. e., no history of pain, restlessness or fever and enlarged glands of the neck, accentuated the well-known symptoms of the disease. The route of infection of the middle ear in infants and adults is probably *via* the eustachian tube from tubercular ulceration in the nasal pharynx, eustachian tube or blood stream from the lungs. In adults coughing and blowing the nose is the most usual way of forcing the tubercle bacilli into the eustachian tube and middle ear. In adults with pulmonary tuberculosis the organism is difficult to find in a discharging ear. An immunity develops or a local resistance from mixed infection inhibits the growth of tubercle bacilli in the middle ear cavity. The presence of the tubercle bacilli does not argue against operation.

The recovery after mastoiditis is just as rapid as in the case due to simple pyogenic infection. The administration of ether or chloroform in advanced cases of pulmonary tuberculosis usually causes death. A case of mastoiditis secondary to a pulmonary tuberculosis should be operated under local anesthesia—preferably novocain and adrenalin, fortified by at least one dose of morphine and hyoscin, and this supplemented by gas oxygen when necessary. The writer has been able to do the complete operation under 1 per cent. novocain and 1-10,000 adrenalin, supplemented by morphin (¼) and hyoscin (1-150). The following are the directions employed by Cocks and Dwyer for isolating and cultivation of the tubercle bacilli from a discharging ear:

"The method we employ is somewhat different from Petroff's. It is really a combination of Petroff's method of isolating from sputum and his method for feces. This modification was rendered necessary by the large number of spore forming organisms often present in chronic otitis. Our technic is as follows:

After obtaining the aural discharge in wide mouth bottles, it was immediately saturated with sodium chlorid and allowed to stand for from half an hour to an hour. At the end of this time the bacteria are found floating on the surface. This floating film is then collected with a deflagration spoon in wide-mouth bottle and an equal volume of normal sodium hydroxid added. The mixture is shaken well and left for digestion in the incubator at 37 degrees C. for one to two hours or longer, care being taken to shake it every half hour. The mixture is then neutralized to sterile litmus paper with normal hydrochloric acid, and the sediment is innoculated into several test tubes. Growth usually occurs in from fifteen to thirty days."

Petroff's media is suggested as the most reliable one and is prepared according to S. A. Petroff (*Journal of Experimental Medicine*, January, 1915, page 39) after the following:

"Two parts of egg (white and yolk), one part of meat juice. Gentian violet sufficient to the proportion of 1 to 10,000. Meat juice 500 gm. of beef or veal are infused in 500 c.c. of a 15 per cent. solution of glycerin in water. Twenty-four hours later the meat is squeezed in a sterile meat press and collected in a sterile beaker.

Eggs—Sterilize the shells of the eggs by immersion for ten minutes in 70 per cent. alcohol, or by pouring hot water upon them. Break the eggs into a sterile beaker and after mixing the eggs well, filter through sterile gauze. Add one part by volume of meat juice."

Gentian Violet—Add sufficient 1 per cent. alcoholic gentian violet to make a dilution of 1 to 10,000.

"Pour about three cubic centimeters in each sterile test tube and inspissate for three successive days—on the first day at 85 degrees C. until all the medium is solidified, changing the places of the tubes if necessary; on the second and third days for not more than one hour at 75 degrees C. For the bovine type omit the glycerin and infuse the meat for twenty-four hours in water. Bovine tubercle bacilli grow in this medium, even if it contains glycerin, but on account of the popular belief and the lack of data, we used a medium without the glycerin.

From a careful calculation it appears that if a single organism divides in two, it will take approximately from six to seven days to grow to a pin-point colony and be visible. To confirm this, five organisms were isolated by Barber's method and inocculated in a test tube containing Gentian violet egg meat juice media. Every twenty-four hours the tubes were examined. On the sixth day three pin-point colonies were visible. The strain of the tubercle bacilli used in this experiment was well adapted for growth outside the body, having been isolated two years previously. This experiment shows that under most favorable conditions it will take at least six days for a single tubercle facillus to grow to a visible colony."

Herbert Fox (*Journal of Medical Research*, July, 1915), contributed an original article on the nature and clinical importance of pseudo-diphtheria. Pseudo-diphtheria bacilli, according to Fox, are rods somewhat shorter and plumper than the typical bacilli, solidly staining or occasionally of double wedge shape, or barred, sometimes growing into larger curved, barred and beaded forms; growing meagerly upon coagulated serum, but much better than diphtheria bacilli upon agar. They produce no soluble toxin, and animals are little if any affected by injections of fluid cultures or bacillary masses, and little or no reaction results. Typical diphtheria bacilli are virulent to guinea pigs. Fox is of the opinion, mildly speaking, that a pseudo-diphtheria may come from a true Klebs-Loeffler bacillus by a process of mutation. The pseudo-diphtheria bacillus is found frequently without pathological change in the nose, throat and external ear. In the nose the organism is called the bacterium coryzae segmentosus. The author makes the statement that many cases of unilateral tonsollitis are due to the virulent pseudo form. These cases get well by local treatment and process of self-immunization.

The role of the nasal sinuses as an etiological factor in the causation of blindness has received some attention. The report of three cases of blindness and compilation of the literature by H. H. Stark, El Paso, Texas (*Journal A. M. A.*, October 30, 1915), is the most comprehensive study of the subject of sinus disease in relation to the eye that has appeared during the year. The author calls attention to the most frequent ocular symptoms of sinus disease, and they are a central scotomia and enlargement of the blind spot. The eye affection is usually unilateral, and pain is complained of more or less. Congestion of the optic nerve head is observed. Examination of the nose may show nothing pathological, and this applies to the ethmoid cells. A closed sinus affection is not infrequently observed in the posterior ethmoid cells, and is infrequent in the frontal and antrum of Highmore. Pain in the eye, blurring of vision, central scotomia and enlarged blind spot, unilateral, is highly suggestive of posterior ethmoid sinus disease as the etiological factor. The ethmoid cells should be exposed, regardless of the absence or presence of apparent pathological change.

In the realm of otology little progress can be recorded. Dench (*Laryngoscope*, August, 1915) has compiled the statistics of the New York Eye and Ear Infirmary from 1904 to 1915, relative to labyrinth disease. During eleven years 45,998 middle ear diseases were treated. Out of this number 45 were operated for labyrinth disease, or less than one-tenth of one per cent. The above statistics are probably the best index to the present infrequency of this operation. A few years ago the labyrinth operation was quite the rage. To-day, however, it is almost or never indicated. Most labyrinth diseases are peri-labyrinth in character, and disappear after free drainage of the middle ear and mastoid process.

There has been little advance in the therapy of syphilis of the ear. Oscar Beck in *Annals of Otology* a year ago reported that in examination of fifty-six cases, in only a small percentage of cases was a shortened bone conduction not found. The observation of Beck corresponds with the great majority of otologists who find a shortened bone conduction as one of the early symptoms of syphilis. Cases of this character should have a preliminary round of mercury before the administration of salvarsan. By so doing the so-called Herxheimer reaction can probably be prevented.

George H. Willcutt (Section on Laryngology and Otology, *A. M. A.*, June 22, 1915), in a paper on the "Disturbances of the Acoustic Nerve in the Early Stages of Syphilis," gave his deduction from an examination of 293 cases of syphilis with a review of the literature. His conclusions correspond with those of O. Beck, Emerson, Crockett and many other otologists. The acoustic nerve is, according to Willcutt, the most sensitive of the cranial nerves, and quickly attacked by the toxins of syphilis. Profound deafness from acquired syphilis is rather an infrequent disease. A slight deafness unilateral or bilateral is the rule. Syphilitic deafness is slowly progressive, and while even in old cases can be accurately diagnosed, treatment is of no value as far as the relief of deafness is concerned.

Virginius Dabney, Washington, D. C. (*Interstate Medical Journal*, May, 1915), reports a case of Bell's palsy and neuritis of the eighth and twelfth nerves following the administration of salvarsan, and from the history of the case Dabney concluded the inflammation was an arsenical neuritis.

The writer, in commenting, takes the liberty of saying that auditory nerve deafness is frequently the first symptom of brain syphilis.

A renewal of interest in the subject of ozena has been stimulated by the preliminary report of Henry Horn of San Francisco (*Jour. A. M. A.*, August 28, 1915) and L. K. Guggenheim (*Interstate Medical Journal*)

The question of the true cause of ozena has been active in the minds of rhinologists, particularly since the discovery of Perez in 1900 of a coccobacillus, and subsequent verification in 1913 by Hofer of Vienna, as the etiological factor of ozena. Hofer recommended a vaccine made from the killed coccobacillus. Horn and other followers of Hofer are sanguine as to the role of the coccobacillus of Perez in the true etiological factor in ozena and the value of vaccines as a curative agent. The conclusions of Hofer are probably correct. The isolation of the bacteria and preparation of the vaccine is so difficult that it may be a long time before the treatment becomes universal, and in the meantime careful opening of all the ethmoid and sphenoid cells and others when indicated, with free drainage and aeration of the attic of the nose in early cases, is probably the most satisfactory treatment. The following are the conclusions of Horn:

1. The coccobacillus fœtidus Ozænæ Perez, as isolated by Hofer, has answered all the bacteriologic requirements necessary to establish its identity as the etiological factor in Ozena.
2. The isolation of this organism is attended with considerable difficulty.
3. The production of agglutinating serum in rabbits is an exceedingly difficult task.
4. The preparation of autogenous vaccines in every case is very difficult, if not impossible.
5. At present, mixed vaccines made from various strains of Perez bacillus is the most practical method of treatment which is now available.
6. It may be necessary to precede or combine with the treatment the vaccines made from the organisms which are usually present in combination with the Perez bacillus.
7. It may be possible that there may be two or more types of Ozena bacteriologically different but clinically identical.

There has been no new therapy or instruments of distinct improvement over last year, and chronic catarrhal deafness still remains the *bete noire* of the otologist.

702 Title Insurance Bldg.

In exophthalmic goitre there is frequent throbbing of the large arteries. There also appears to be dilatation of the arteries throughout the body generally, as the skin is unusually warm as well as moist.

PROGRESS IN THE TREATMENT OF THE DISEASES OF THE THROAT DURING THE YEAR 1915.

SETH SCOTT BISHOP, B.S., M.D.,
Chicago.

The Tonsils.

One of the most striking characteristics of the literature on the throat during 1915 is the relatively large amount of attention which has been devoted to the tonsils. Not only this, but there has been a positive movement toward conservatism on the subject of operations upon the tonsils. The pendulum had certainly swung too far in the opposite direction for several years, in which time a multitude of throats had been punished by general practitioners whose ambition eclipsed their skill in their earnest endeavor to keep pace with over-enthusiastic specialists.

Illustrative of this reversion of sentiment is the position taken by Max Goerke, who advocates conservation of the tonsils. In many cases he advises, in young patients, irrigation of the crypts and painting them with tincture of iodin. If an operation is imperative, he prefers tonsillotomy. "We must regard as absurd the theory that the body contains any organ possessing no function other than to flood the organism with poisons." He therefore utterly disagrees with the statement of Bosworth that "the existence of tonsils should be regarded as a disease." (*Jl. of Laryngology,* London, August, 1915.)

The following are the conclusions of Julina Conroe relative to the functions of the tonsils: "(1) Protective. The tonsils are generators of lymphocytes and leucocytes, which are undoubtedly present in large numbers, where they may even be stored up for ready action when called on, and in addition to their specific bactericidal action, a constant stream of lymph from the depth to the surface exists, which alone would protect by counteracting an invasion of micro-organisms and by clearing the surface of these undesirable settlers. (2) Defensive against absorption by antagonizing the entrance to their interior of infectious germs. (3) Internal secretions endowing the tonsils with physiological and biological functions. (4) Lubricant. (5) Voice. The tonsils possess important mechanical acoustic and phonetic functions. (6) Immunity. By a process of continual auto-vaccination the tonsils protect the body against chance infection." He protests against the "indiscriminate removal of the normal tonsil," but believes in the propriety of tonsillectomy: "(1) When these organs greatly interfere with respiration, and thus lead to insufficient oxygenation of the blood; (2) when they are actually diseased; (3) when there is no reasonable doubt as to their being either directly or indirectly an etiologic factor in the production of disease." (*Jl. of Laryngology,* April, 1915.)

There seems to be a strong tendency toward the following position as to when and how offending tonsils should be removed: They should be removed (1) when they are sufficiently enlarged to obstruct free respiration; (2) when they embarrass or muffle the voice; (3) when they give rise to a distressing sense of a foreign body in the throat and frequent swallowing to relieve it; (4) when they are the seat of recurring inflammation, which endangers the integrity of the ears, nutrition, and the evolution of the jaw during the period of second dentition; (5) when they are associated with enlarged glands in the neck; (6) when there is reason to believe that they are an etiological factor in attacks of rheumatism; (7) in cases that are subject to repeated attacks of peri-tonsillar abscess; and (8) when they are associated with adenoid growths in the vault of the pharynx. These are positive indications for an operation, and in these conditions patients will be benefited by an operation. Moreover, under such circumstances, the benefit to be derived from operations for the removal of these trouble-producing glands is both local and general.

When tonsils are not enlarged to the extent of producing symptoms of their hypertrophy, and when they are not the seat of a diseased process, there is no good reason for operating. There are physicians who make it a practice to operate on every enlarged tonsil, whether the gland has given rise to any symptom or not. There is an increasing wave of sentiment against this habit. Nature placed these organs in the throat, and I have seen thousands of them which presented no history of ever having given any offense. We do not yet know the precise relation that they bear to the system of ductless glands, or the relation of their internal secretion to the blood cells. The normal tonsil, also, is undoubtedly concerned in the production of the voice, by improving its resonance and assisting in giving direction to the column of air while keeping the pillars of the palate separated from each other.

While hypertrophied and degenerate tonsils may impede the movements of the system of muscles of the throat that are concerned in phonation, the healthy tonsils are an aid to normal voice production. By removing those that are so large as to interfere with perfect vocalization, the voice is improved. On the other hand, the removal of glands that are not pathological, or the performance of an operation which is too radical, may impair the voice.

The choice of an operation lies between tonsillotomy and tonsillectomy. By the former is meant excision of the tonsil; by the latter, complete enucleation of the whole gland.

By the use of the tonsillotome, to guillotine the tonsil, a sufficiently thorough operation is had to remove all of the tonsil except a small cushion of the tissue next to the underlying aponeurosis. But, in order to obtain this result, the operation must be performed differently from the method of many physicians. I have frequently found in patients brought to me for operation that the apex of the tonsil had been merely clipped, leaving nearly all of the gland behind. Such a method is futile, since it does not accomplish the purpose of the operation.

In order to obtain satisfactory results, a reliable assistant should press inward very firmly over the base of the gland when the ring of the tonsillotome is forced down upon it close to the aponeurosis. Then the guillotine will remove most of the body of the tonsil. If the pillars of the palate are adherent to the gland, they should be first freed so that the fenestra of the tonsillotome may embrace the tonsil near its base without injury to the pillars. By this method Douglas Guthrie of Edinburgh (MEDICAL TIMES, November, 1915), claims that "one can force the entire tonsil through the ring of the guillotine and hold it there while the blade is pushed home."

A fair statement of the consensus of present opinion appears to be as follows: While tonsillectomy may be advisable in certain cases, it presents disadvantages and objections which cannot be urged against tonsillotomy properly performed. Enucleation of the whole tonsil leaves a large concavity at the side of the throat, which

gives an unnatural contour to the pharynx. Tonsillotomy, properly done, strikes a mean between the two extremes of an original convexity and an artificial concavity. Tonsillotomy leaves a modicum of tonsillar tissue to keep the faucial pillars apart, enabling them to play their part in voice production. It also permits a continuation of a modified function of the gland. In this connection it is appropriate to refer to the fact that we do not advise the removal of the whole body of the thyroid gland. The medium ground is not only suggestive but logical. Tonsillectomy is followed by the formation of extensive scar tissue and contraction of the same, which cause a drawing sensation or constriction and a sense of dryness of the throat. I have never known these symptoms to follow my operations with the tonsillotome.

Peritonsillar Abscess.

Peritonsillar abscess is treated by Levinger by dissection and extirpation of the upper pole of the tonsil at as early a stage of the inflammation as possible under cocain, as being less likely to open lymph and blood-vessels to infection and as affording drainage. (*Jl. L. R. and O.*, London, January, 1915.

Dental Conditions and Throat Diseases.

The increasing alertness and thoroughness of throat specialists are evinced in the expanding literature relative to the effects of diseases of the jaws and teeth in the causation of throat diseases, and the interdependence of the work of the dentist and throat surgeon in curing many cases. It is an encouraging sign of the times that the leading authorities in the field of dentistry lay increasing emphasis upon the advantage enjoyed by those dentists who have acquired a general medical education. Were there space, it would be interesting and instructive to quote from such voluminous writers as E. S. Talbot and other dental surgeons.

Naso-pharyngeal Fibromata.

Conservatism appears to be the order of the day in the management of new growths of the throat. For example, Robert Neuenborn cites cases of naso-pharyngeal fibromata which have disappeared at about the age of twenty years. He regards the operations through the split hard and soft palate, or permanent resection of the upper jaw, as more dangerous than the tumor itself. (*Jl. of L. R. and O.*, London, January, 1915.)

Adrenalin in Laryngeal Carcinoma.

Pugnat published the description of a case of proved carcinoma of the larynx that atrophied slowly after an injection of adrenalin. After six months the larynx was normal; but a submaxillary gland which was enlarged remained so, and, after the expiration of another six months, increased to such a size as to kill the patient by eroding the carotid, although the larynx remained normal. (*Arch. Internat. de L., O. et R. Lond.*, January, 1915.)

Laryngo-fissure for Epithelioma of the Vocal Cord.

Herbert Tilley presented a case before the Royal Society of Medicine in which he performed a laryngo-fissure operation, restoring the voice, which, nine years after the operation, was useful in addressing public meetings. Tilley also showed specimens of vascular fibromata removed by him from the larynx. One of these was situated in the anterior commissure, and was concealed by an overhanging epiglottis. He operated under a twenty per cent. cocain anesthesia. Dr. Killian declared that he removed the greater number of laryngeal tumors by the indirect method, upon which fact he was congratulated by Felix Semon. Dundas Grant, Cyril Horsford and Fitzgerald Powell expressed the same preference. Some of the speakers mentioned that they depended upon a thread passed through an overhanging epiglottis to keep it in position during the operation. The thread is brought out of the mouth and held taut by the weight of forceps attached to it. In January, 1900, the writer devised an epiglottis retractor (Fig. 1) which greatly facilitates operations in such

Fig. 1.—Seth Scott Bishop's Epiglottis Retractor.

cases, and renders it unnecessary to pass a thread through the epiglottis. By means of this aid and an especially long antero-posterior laryngeal biting forceps (Fig. 2), devised by the writer at the above mentioned time, one can grasp and remove growths springing from the vocal cords, and below them, which cannot be reached by the Mackenzie forceps, the more especially in the low-lying larynx. The significance of this fact is apparent in view of the greater possibilities of re-

Fig. 2.—Bishop's Long Antero-posterior Laryngeal Forceps.

storing and preserving the voice by means of operations within the larynx by the natural route—the mouth and pharynx.

Scopolamin for Throat Operations.

Myron Metzenbaum, in a paper read before the Columbiana County Medical Society, February 9, 1915, gave an account of the beneficial effects of scopolamin in 1/100 grain doses—1/200 in children—administered one-half to one hour preceding all operations on throat and nose. "It prevents reflex inhibitory stimuli coming through the superior laryngeal nerve and its branches to the vagus, and it holds in check the secretion of mucus during ether anesthesia," and diminishes the flow of saliva. Fear and irritability give place to calm and self-possession. Patients go more rapidly under the general anesthetic and manifest less resistance, so that less of the anesthetic is required. They awaken more rapidly, and the anodyne effects last several hours. "In physiological doses it seems free from any immediate or remote detrimental effects, while its benefits are to quiet the patient, benumb his sensibilities and lessen his irritability."

Pituitary Extract in Throat Operations.

Harry Kahn and S. E. Gordon report exceptional control over hemorrage in more than 100 cases of operations on the tonsils. "Our cases, with the exception of three, were children from four to twelve years old, to whom 12 minims of the drug were given hypodermically.

The influence upon the time of coagulability of the blood was profound. It was reduced from one-third to one-half. In some cases a greater reduction was noted. For instance, one case required four minutes before the drug was administered, but fifteen minutes after the administration it required only one minute. Another was reduced from three and one-half minutes to 45 seconds, and still another was reduced from two minutes to 45 seconds, etc. Pituitary extract was given hypodermically in the dose of 12 minims to children, and 15 minims to adults, not less than 15 minutes before the anesthetic. The coagulation time was taken before, and again after, the 15-minute interval. Blood pressures were taken at the same intervals. The following are the conclusions:

(1) The coagulation time of the blood is materially reduced by the hypodermic.

(2) The hemorrhage following operations is much reduced.

(3) The effects upon the blood pressure of children is variable. Systolic pressure was increased in 55 per cent. of cases, reduced in 36 per cent., unchanged in 8 per cent. Diastolic pressure was increased in 35 per cent., reduced in 35 per cent., and there was no change in 29 per cent. Pulse pressure is increased in 61 per cent., and decreased in 39 per cent." (*Annals of Ot., Rhin. and Lar.*, June, 1915.)

31 N. State Street.

PROGRESS AND PRESENT STATUS OF THE TREATMENT OF DRUG AND SPIRIT NARCOSIS.

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During 1915 unusual interest has been centered about the treatment of spirit and drug narcosis. The Harrison anti-narcotic law, which makes it difficult to procure drugs for narcotic purposes, has driven a great many secret drug takers into publicity with urgent appeals to both physicians and druggists for help. The fact that every prescription for narcotics must be registered and filed, with the name of the purchaser and user, is regarded with apprehension by all drug addicts.

Quacks and irregulars purchased larged quantities of narcotic drugs in anticipation of this revolution in the sale, and are now selling them through secret sources, at panic prices. The government inspectors have secured commitments for persons of this class, in all parts of the country, and courts have given them the full penalty of the law. A special building in New York, endowed for the impecunious drug taker, is significant of a new class of cases, calling for medical help. All the public and charity hospitals in the country are receiving a constantly increasing number of persons of this class, who either openly acknowledge their drug taking, or are admitted for other troubles, which are found to be due to this cause. Private and corporate sanatoriums recognize this increasing army of drug takers, who appeal for help. As usual, irregulars and charlatans of all grades come into prominence, claiming new discoveries and new methods of removing the drug in the shortest time with the least suffering. Institutions are opened, mysterious treatments are advertised to be taken at home and cures of all kinds are promised; this appeals to the credulity, and an intense desire to have the drug removed secretly is furnishing a rich harvest to these promoters. Results are already noted in the relapsed cases, with general derangement of both body and mind, worse than the former condition. The drug is removed, but other drugs are substituted. When they are dropped, a return to the former condition is certain, with less vigor and resistance than before. Finally the family physician is appealed to, and after one or two efforts to help such persons, he gives up in despair and sends them to some advertised cure, or advises them to try some course of treatment at home.

All this fails and the patient loses hope. A certain class of addicts are fortunate in having wise medical advisers, who realize the complicated treatment necessary, and send them away to some reputable hospital and home. Here they are made to understand that the withdrawal of the drug is not the entire cure, but really only a small part of it; that this withdrawal will vary with the person, but in most cases, should cover a period of many weeks, and that a study of the original causes and their removal, must begin and go on during this withdrawal treatment. Also that each person is a law to himself, and should be treated according to the conditions present, and not from any uniform plan of specific treatment. Restoration follows as a rule, from hospital treatment, in which the drug is removed and the question of after care and treatment is decided. In the hospital where the withdrawal is the first essential, there are hydropathic, electrical and radial appliances that are made more effective by surroundings, together with drugs and other means that have been found useful, that are distinctly applicable to the person.

In home treatment under the care of the physician, this can be continued or varied, according to the conditions, in which exercise and mental and physical rest, with psychical aid and training can be applied, which bring about permanent cure. The drug taker is literally poisoned and starved. The removal of the one and the restoration of the other, are the two conditions requisite for recovery. The poisons to be removed, are not all due to the drug taking, but to autotoxins and toxemias, formed within the body, which often have a more pronounced effect and are equally dangerous to those of the drugs taken. In most instances, narcotizing the sensory centers continuously deranges the metabolism of the body and furnishes favorable soil for the growth of toxaemias and perversions of cell and nerve energies that may center in different parts of the body. The removal of one drug, and the substitution of another of the same general class, on the assumption that the latter can be withdrawn more easily and with less danger, is an uncertain process. The substitute drug may be far more injurious than the drug which it supplants, paticularly under the conditions in which it is given.

There is an unknown field of drug effect here that cannot be estimated. Appeal to the facts show that persons taking substitute drugs are more degenerate and weaker than others who have not used them. Many experiments have been made for another purpose which revealed this fact very clearly. Thus one specialist treated cases of this kind with concentrated tinctures of cinchona bark. Another believed that bromides were the specific treatment, and for a long time, made very careful studies to confirm this. In both these instances the number of relapses was very large, and the debility of the persons who were treated, was marked. Another specific drug contained large quantities of strychnine and very pronounced effects of this drug were apparent a long time after treatment. The removal of opium and other narcotics uncovers unknown pathological conditions which may be

hypersensitive to spirits or to some other drug. These drugs may be continued for a long time, without apparent injury. The susceptibility and neurotic weakness, both local and general, found in the drug taker, vary widely and must always be recognized in general treatment. The experience in all well organized institutions, indicates that the gradual or rapid withdrawal of the drug, according to the condition of the patient, can be done, with little or no suffering, and without the substitution of other narcotics. There are no specific substitutes that are harmless. Many drugs are known, the effects of which, counter-act the narcotic drug and assist the powers of nature in recovering from the injury. Experience shows that persons make a more rapid recovery where mineral salts are used, and where nutrition is studied and applied medicinally. A very large number of drug takers are practically in a chronic stage. Their period of addiction has extended over many years and is traceable to some defect both inherited and acquired. Another fact is that drugs are taken for physical reasons to a very large extent, to relieve pain, discomfort, irritation and fatigue, or possibly to cover up some agonized mental condition. It is a knowledge of these facts that give a distinct intimation of the methods of cure.

During the past year, the question has been raised, concerning the number of drug addicts in this country. Several studies have been made, all of which indicate that practically about half a million persons are afflicted with this addiction. They are not all known as drug takers. The use of spirits is so complicated with drug addictions and pronounced nutrient disturbances, as to conceal a great many of the real causes. There are a great many persons who believe that the number of drug addicts is increasing in this country, and this undoubtedly is true, owing to the prominence of certain distinct factors. Every year, physicians are being consulted more frequently than ever, concerning the results, both direct and indirect, of drug taking. Unfortunately there is very little authoritative literature that can be relied upon. Among the two or three text-books on the subject, one is written by the author of this article, on "Morphinism and Narcomanias from other Drugs," (W. B. Saunders & Co., Phila.) The other books published contain a great variety of well stated facts and most excellent studies. More than 20 papers have been published during the year, in the different journals on drug addictions and their treatment, indicating beyond question a demand for authoritative literature in this field that will be helpful to the general practitioner.

There is something very significant in the fact that the legislation on the sale and use of drugs is very largely the work of laymen, who have realized the danger from this source and have sought in this way to prevent it; while on the other hand the physicians, who of all other should be most active in this, have shown their old time conservatism of waiting and looking on.

The Study and Treatment of Spirit Narcosis.

There has been an equally growing interest in this subject, probably stimulated by the reform movements which are becoming more intense every day. This interest grows out of the very startling statistical studies of life insurance companies, health boards and hospital records. Thus in a single study of pneumonia and nephritis, 70% of the fatal cases were traceable to degenerations from the use of alcohol. In the hospitals, studies of operations show that where the patient has used alcohol, the prognosis is always grave, and most unexpected results follow. The life insurance companies show that the mortality rates are increased from 10 to 20%. This, with the research work done in the laboratory on the effect of alcohol on cell and tissue, show that alcohol is one of the most active and prominent causes of degeneration and disease.

In the studies of preventive medicine, the prominence of alcohol as a cause of criminality, pauperism, accidents and losses of both property and health is becoming more and more recognized. The fact that alcohol is one of the most dangerous of all the drugs known, is confirmed by observations in every circle of society. The text-books openly declare that alcohol and syphilis are the most active causes of disease and degenerations today.

The questions of treatment have been most confusing for the last 25 years. Here as elsewhere, quacks have asserted their discoveries of secret remedies and gold cures, claiming permanent restoration in 95% of all persons treated. This has not been verified, and while fully 90% or more of those treated have relapsed, there has been a species of education going on in the public mind that there were medical means and measures that could be used to bring about successful results.

The American Society for the Study of Alcohol and other Narcotics, composed entirely of medical men, declared in 1870 that spirit narcosis and neuroses was a disease, and was as curable, as any other disease. This has not been endorsed by the profession until within the last few years. Now, there is a general sentiment that wherever a man is found using spirits to excess, he should have medical care and treatment. The fact is becoming fixed in scientific circles that the alcoholic and inebriate, by the continuous use of spirits, become more and more degenerate and develop distinct neurotic diseases, which can be overcome and treated successfully in a large proportion of instances. The quacks assert that they have found substitute drugs to take the place of spirits, and that short treatment based on symptoms, in which the drink craze is destroyed, is a permanent cure. Literally, short treatment by substitute drugs, leave the victim more degenerate and unable to overcome future exposures.

Studies of these neuroses show that the moderate drinker, who has a delusive egoism that alcohol does him no harm, and who never appears to be the worse for it, is really the most diseased of all persons of this class. He does not die directly from spirits, but usually from some acute inflammation or hemorrhage. The periodic drinker suffers from a convulsive neuroses, which moves in a cycle, gathering and breaking in an obsession for spirits that is only satisfied when the patient is completely narcotized. Then the obsession dies out and the patient recovers and has a free interval of sanity and apparent health. Both of these classes suffer from auto-intoxications, toxaemias and anaemias, and a variety of other pronounced physical conditions. Experienced physicians who have treated many cases of this kind, recognize the physical conditions and the possibility of overcoming them, but it must be along the lines of accurately observed facts, and by well attested means and measures. They also agree that hospital treatment is the first essential, a sort of a first aid to the wounded, where new surroundings and new means and measures can be applied to overcome the present conditions. This is not secured in penal institutions, where enforced restraint is the principal

(*Continued on text page* 28)

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The Proposed Health Insurance Bill.

We have received from the American Association for Labor Legislation a tentative draft of a health insurance bill which is to be introduced in the Legislatures of various States, among them New York, in 1916, together with some suggestions as to the lines our editorial comment on the draft should follow. But, of course, in what we shall have to say we shall not be slavishly bound by the Association's suggestions.

It is taken for granted by the sponsors of this bill that the socialization of medicine is a desirable thing, that it is impending, and that aside from certain necessary preliminaries, such as laying the legislative foundations, about all that remains to be done is to arrange the duties and reimbursements of the physicians who are to serve under the proposed system. So far as we know, neither employers nor the medical profession have been consulted until the present moment. We of the profession are now requested to furnish *constructive criticism*, and therefore it is to be presumed that employers also are to be taken into the reformers' confidence.

The act aims to make health insurance compulsory. Insured manual workers and others earning not more than $100 a month are to be provided with medical and surgical care, nursing attendance, hospital care when necessary, medical and surgical supplies, including medicines, dressings, eyeglasses, trusses and crutches, and a cash benefit equal to two-thirds of the wage for a maximum of twenty-six weeks in a year. Their wives are to be attended in childbirth, and, if they are also insured, are to receive a cash benefit for eight weeks. Medical care to the entire family and a funeral benefit are granted in case an insured wage earner dies.

The expense of the proposed system is to be divided as follows:

Section 18. Division of Expenses.—The expenses of the association shall be met by contributions from employees, employers and the State. The State shall contribute one-fifth of the total expenditures for benefits subject to the provisions of section 38; one-half of the balance shall be paid by the employer, one-half by the employee, except that if the earnings of the Insured fall below $9 a week the shares of the employer and employee shall be the proportion of their joint contribution indicated in the following schedule:

If earnings are under	But not under	Employer per cent.	Employee per cent.
$9	$8	60	40
8	7	70	30
7	6	80	20
6	5	90	10
5	..	100	0

In all cases the contributions shall be computed as a percentage of wages.

Thus in addition to periodical physical examinations workmen will receive medical treatment when ill. This the Association believes will overcome the present objection of organized labor to physical examinations. Physical examinations reveal defects, often remediable, and the workingman is advised about these in a way not now possible because of his unfair share in the profits of industry and consequent inability to seek competent medical treatment.

The tentative draft of the bill plans carefully for the organization of insurance associations in districts into which the state is to be divided, each district to contain not less than five thousand persons subject to compulsory insurance. The provisions which will organize the administration of medical aid have not yet been drafted, and it is upon this point that the Association is beginning to feel out the doctors.

The duties of the Social Insurance Commission would be principally judicial and supervisory. Its purely administrative functions would be few. The draft proposes a non-partisan commission of several members, with terms expiring at different times, rather than a single commissioner. It is also suggested that other forms of social insurance, such as workmen's compensation, might be brought under the supervision and control of the same administrative organ; hence the all-inclusive title—Social Insurance Commission.

A social insurance council formed of elective representatives of employers and employees is to be joined to the Commission in an advisory capacity. This council would have no power to obstruct or delay the execution of the Commission's orders. Its participation on the judicial side would lighten the work of the commissioners and provide technical knowledge. This would make administration more surely mutual and would increase the interest of beneficiaries and contributors and their knowledge of the operation of the system.

How would the interests of labor be affected by such an act? The cost of operation would, of course, fall to industry. In the last analysis it would be borne by the workers themselves, whose labor produces all wealth, just as the costs of old-age pensions, charity, workmen's compensation and all the other devices of our benevolent feudalism necessarily fall upon labor. Then employees would be selected with a view to their likelihood not to be sick. The physically doubtful or unfit and the men with families would be forced out because of the increased expenses that their employment would necessarily entail. But leaving all these considerations out, what character of medical service would the workers receive? That, it seems to us, would depend upon whether the physicians were to be organized in such a way as to impose upon them too much work, two little remuneration and a status not essentially dissimilar from that of,

say, letter carriers, or in such a way as not to sacrifice a single professional standard. We are strong for reimbursement in some form for the services that are rendered so munificently by physicians to people in and out of hospitals who are unable themselves to pay, usually because of the fact that they are victims of social and economic injustice, but we honestly do not believe that it can ever be given us without some sacrifice of dignity and honor on our part so long as it does not come direct from the working man himself actually receiving his fair share of the profits of industry.

The resemblance of this plan to the British Insurance Act is obvious. But conditions in this country, with respect to already existing benevolent societies, are vastly dissimilar. It ought to be absolutely impossible for our esteemed reformers to "put over" anything remotely resembling the British brand of insurance, if indeed they succeed in putting over anything. If we thought that anything like that were going to happen we should advocate in anticipation another piece of legislation as a foil to meet the emergency. We should have a bill introduced providing for an exchange between the doctors affected and bricklayers, the doctors to become bricklayers and the bricklayers to become doctors. This would be logical, for the following reasons: Instead of working day and night on the insurance panels, making no scientific diagnoses and handing out about three drugs to the forty sick people seen—calomel, bromide and morphine—instead of that the doctor could take a three or six months' course in bricklaying and then earn a living in a self-respecting way, working eight hours a day. The bricklayer, on the other hand, could be given a three or six months' course in medicine and would then be well prepared to go out and give just the kind of service required. We should hope that this plan, no more disingenuous than that of the Association for Labor Legislation, would not alarm or offend the bricklayers upon whom we should seek to confer a quasi-professional status and the dubious mantles (uniforms?) of socialized doctors.

Well, we have long worked for the poor for *nothing;* we have taken care of them in hospitals and dispensaries and in their homes, for nothing. To the degree that we have done so we have been guilty, not of altruism, so-called, but of acting as retainers of the master class directing our benevolent feudalism, making the ghastly programme of philanthropy possible as partial reparation for industrial exploitation and robbery. With stupendous resourcefulness and cleverness, for capital can buy brains as well as coal and the muscles and souls of men, paternalistic schemes are hatched which narcotize for a little longer our brutalized workers. The poor beasts cannot withstand these candy sticks and succumb.

Shall we succumb, too? We who have so consistently and patiently served the master class—how shall we revolt now? We are sick men, and our masters stand over us with their persuasive bludgeons.

What ho! sick men. What say ye to the "tentative draft" which your masters deign now to reveal to you before presentation to the Legislature of 1916?

Is There a Lie in the Burial Service?

A distinguished clergyman in a public address recently delivered from the steps of the City Hall in Brooklyn declared that there was a lie in the burial service—that the practice of ascribing deaths to the Almighty instead of to the true causes was lying of a pretty base order. His declaration aroused a great deal of professedly righteous wrath.

The wrathful reaction evoked by his brave words is an exact measure of the criminal stupidity of those who mould public thought. Why should an intelligent editor of a great metropolitan daily not know better than to ascribe to God a death from typhoid fever the source of which is polluted drinking water? Why is it blasphemous in this year of grace to tell the truth about the real origin of infectious disease?

Our compliments to the Reverend J. Howard Melish and our good wishes to him in his efforts to state medical truths and defend the Lord against the most hackneyed of slanders.

Who would have believed that such a simple and honest enunciation would have invited attack? What have the Dark Ages got on us, anyway?

The Police Surgeon.

A number of croakers have appeared of late who have found fault with medical servants of the municipality because of part time service and what are considered large salaries. The police surgeons in particular have been assailed. These men are properly paid for the service that they render, and hence have been able to do absolute justice to their work, which can never be the case when men are underpaid. But a point in relation to their part time service has not, we think, been made in their favor. The point is this: Most of these men are visiting physicians or surgeons to various public or quasi-public hospitals and give a large part of their time and energies to the care of patients who are public charges, so designated by the Commissioner of Public Charities and so paid for by the Comptroller. We do not mean to say that the city is in any way legally liable for the services so rendered, but we think there is a moral liability. Why should skilled medical men be hounded in any way who are giving so generously of their time to municipal service? They do not stint the city in giving freely of their best powers. When they begin to do that it will be time to stint them. One reason why they form such a splendid body of municipal medical servants to-day is because they have been properly and justly dealt with by the city governments of the past. Any departure from that policy will mean the end of that tone and that enthusiasm for service which have hitherto distinguished the police surgeons.

Ethical Decencies—Who Cares About Them?

We have had a surfeit of late, in the newspapers, of information about defective babies and their right to live—or lack of right.

What about the ethical propriety of discussing in the press the peculiarities of our patients?

What about the lack of consideration shown parents and relatives in these circumstances?

We notice that the most "eminent" men do not appear to hesitate, when interviewed, to air their views.

The mere fact that parents do not object to such pitiless publicity, or that they give their consent, does not, it seems to us, alter the bad taste of these performances. If parents are lacking in sensibility why should we act like boors rather than gentlemen and physicians?

Because parents are simpletons and because the public wish to read sensational and gruesome details about these cases is no reason why doctors should violate the professional decencies.

In bony ankylosis of the shoulder osteotomy of the neck of the humerus may be advantageously employed.

Miscellany

CONDUCTED BY ARTHUR C. JACOBSON, M. D.

Our Forceful and Fascinating Cranks.

A little knowledge of psychiatry is wonderfully helpful in enabling one to gauge the nature of the motive force of some of our more or less noted "publicists."

The spasmodic character of most reformers' efforts is noticeable and significant. To paranoid ideas seems to be joined the manic-depressive urge. The reformer on his psychic spree is hardly to be recognized in his moments of inaction. It is true that one often notes the fixity of a single idea, worked to death throughout the agitator's life. This is more like a true paranoia reformatoria, to be sure, but we submit that the common or garden variety of publicist conforms more commonly to the manic-depressive type. Let us consider both varieties.

Aside from his one idea, the agitator who conforms to the paranoiac type is apt to be marked by a forceful personality which brooks no opposition and by a self-confidence that is, to say the least, appalling. These traits are commonly thought by admiring simpletons to indicate capability, which is seldom the case, and the result is that their possessor sometimes goes far in his propaganda and achieves a large following, financial returns and more or less power. He never changes his mind, of course, which is thought to indicate force of character. No matter what he comes up against and no matter what reason, prudence and wisdom might dictate he is incorrigible. With him there are no periods of inaction.

The manic-depressive, on the other hand, works enthusiastically upon something for a while, and then puzzles his co-workers by the oblivion to his erstwhile pet scheme which comes upon him. Recovering from his depression it is "on with the dance" along another tangent. When the fit is upon him he is curiously exalted. He is so ecstatic at times that as he goes about or engages in active work on the scheme that happens to be in hand its possession of him becomes painfully evident, but his simpleton associates are enthralled by this very aberration. He is "inspiring." Then comes the recovery from the psychic debauch and he relapses into the depressive cycle. He is really a mixed type, that is, while actuated by a manic-depressive drive there are paranoid concepts behind his varying schemes.

These types used to be common among the perfervid temperance advocates. One encounters them to-day often among suffrage and social reform workers. Both the peace and preparedness advocates are represented. Many are "off" on the subject of sex. The lately deceased Progressive party numbered some choice examples in its ranks. Many of the professional anarchists are pure paranoics. In medicine one observes with wonder, unless he can observe from the psychiatric angle, the persistent antics of certain gentlemen bent upon demoralizing the profession by the infliction upon it of such things as socialization, blind to all the ghastly connotations of this brand of Kultur.

If the paranoiac type happens to hit upon something desirable he may become a useful public servant. We could name brilliant examples, but forbear. This is always an accident, and there is no way of deliberately turning latent possibilities into right action. When discovered, the crank is usually well on his way—has perhaps thrown a bomb at J. P. Morgan or begun to try conclusions with some legislature. In such an eventuality he is utterly beyond control, and if we knew beforehand what was up we doubt whether the steering gear could be set straight.

The time is ripe for the production of an original work in English on psychiatry in its extra-mural aspects.

Upon the whole we love the agitator with a large admixture of the manic-depressive urge. He is far more picturesque and more livable-with, so to speak. Understanding him, we can derive keen entertainment from his vagaries. But while there is this phase to the subject we cannot blink his potential menace. Our final judgment on him would be this. He should be allowed to rant and prance if not personally dangerous, but we should devise definite but kindly curbs for him as a real social factor making for both good and evil. So long as the intelligent who are responsible employ protective mechanisms against his harmful proposals society is safe. In a loose way we are prepared for him, but our preparedness should be more definite. He should be taken more seriously into account than he is at present. That is just the trouble; we permit ourselves to be entertained by him and the first thing one knows he has put something over on us that may be undesirable.

Let us have both the protection and the entertainment too, not to mention occasional—very occasional—contributions of value.

Nothing Added by War to the Debit Side of Eugenics.

Most of us have become persuaded that war has a necessarily bad eugenic effect because of the killing off of so many selected men at the front, yet we have also felt, many of us, that in some way this was compensated for. Now some thinker has supplied the missing data. While good men are falling at the front a hard struggle goes on among non-combatants, a struggle for bread, for health and for life. In the course of this struggle the weakest die. In short, among the civilian population natural selection operates on the high gear during severe, devastating wars. Consider what has been going on of late in Belgium, Poland and Serbia, and think of what the survivors of this kind of warfare will represent as exemplars of the survival of the fittest principle.

So that while good men are dying at the front, the unfit are dying in the villages at home.

So in this way it would seem that a balance, at least, must be struck, which is to say that war does not necessarily leave any bad eugenic effects.

An Easy Lesson for Bewildered Medical Persons.

What is the real reason why practitioners in good standing and of notable abilities are not permitted to attend their patients in hospital—when such practitioners are not members of the visiting staff?

Various specious reasons are ascribed for this. None of the reasons are creditable. The arguments against permitting well equipped gentlemen to attend their patients are like the arguments against woman suffrage—there is no good reason why either consummation should not be achieved by its proponents.

What is the chief reason, and how good a reason can it be made out to be?

The men who look after the sick poor in the public wards have, as a kind of return for their charitable service, private room privileges. All private room patients, whether sent in by them or by other practitioners having no connection with the hospital, are attended by them. In this woodpile the nigger is a painfully obvious person.

Suppose all able and personally desirable practitioners were given private room privileges. Well, there are so many of them that the monopoly of the staff physicians would be utterly broken up, leaving them to their work in the public wards without special privileges on the private side.

The hospital is an aristocratic institution and a staff appointment immediately makes the appointee an aristocrat.

So there is a reason, but it is not a good reason.

Altruism—1915 Brand.

"No man can live absolutely by or for himself. The hermit hunter of the mountains comes down for bullets and gunpowder. . . . On the other hand no man can live wholly for others. In the first place he cannot get around the imperative necessities of his own body. He must provide for himself. The merchant who gives away his goods soon has no goods to give. To come nearer home, the doctor who does not charge for service will not long be able to serve. It amounts in the end to this: A reasonable regard for self is indispensable that we may serve others. A reasonable service for others is indispensable that we may truly serve ourselves."

The foregoing paragraph was written recently by Dr. E. P. Lyon in the *Journal of the American Medical Association*. How different these sentiments from the false and sentimental philosophy of a few years back, when that dear old word altruism used to be so overworked whenever the activities of the medical profession were under discussion.

To-day it is actually taken for granted that the doctor, like other men, has mouths to feed and is otherwise quite as subject to the operation of economic laws as his fellows.

Medical Society Ritual.

We understand that when a gentleman is inducted into the American College of Surgeons and becomes an F. A. C. S. he is put through quite a ceremonial and has to wear certain toggery costing about fifteen dollars. There is a hat of impressive design and something else which we have forgotten—a sash, if we are not mistaken.

This sort of thing is supposed to dignify the proceedings.

Perhaps we ought to dignify some of our other proceedings.

A gentleman reading a paper before the Academy ought to be required to purchase a tin hat, garnished with purple feathers.

We are convinced that the value of his contribution would be distinctly enhanced thereby.

County Medical Society regalia should be, say, a plumed chapeau and pink sash.

The insignia of miscellaneous medical organizations should vary in such a way as to insure distinction. Thus a bear skin shako would be suitable for members of the Harvey Society, after the impressive fashion affected by the Old Guard.

White wigs would seem appropriate for the Medico-Legal Society.

For societies engaged in recondite research black gowns emblazoned with silver stars would look well.

Fools' caps would undoubtedly be becoming in the case of———

But we leave the elaboration of the idea to the imaginations of our readers.

(*Concluded from page 24*)

remedy used, nor in city hospitals, where chemical restraint and drugs are the means used. No short treatments by secret methods, should be considered. While the craze for drink may die out, other and more complex conditions develop, leaving the patient worse than before. Hospital treatment in well-organized reformatories and sanatoriums, where liberty and restraint are carefully controlled, and where the actual condition of the patient is treated and the causes understood, and means adapted to meet the particular requirements is most successful. Such measures are carried on in the most favorable surroundings, where nerve rest, proper diet, exercise and removal of all the exciting causes, with a species of mental training, which cannot be had elsewhere, are combined.

One fact should never be lost sight of, namely, that the obsession for drink is self-limited, and not infrequently dies out and disappears under very diverse circumstances. Thus in many instances, after years of periodic drinking, the person suddenly becomes abstinent and remains so for the rest of life. The causes which he assigns to this change, are confusing and unreliable. The real facts are, some physiological and pathological change has taken place in the brain and nervous system, and the exciting causes have disappeared. In the moderate drinker, acute inflammation and hemorrhage are the terminations. If these are not fatal, the patient becomes an abstainer.

The institutions in this country for the care of alcoholics were very numerous a few years ago. Those depending on secret remedies have largely disappeared. Insane asylums, hospitals and sanatoriums for the treatment of other diseases, have wards for the alcoholics and drug takers, which are usually filled. A few institutions still remain, where moral remedies are made dominant in the cure. A few small private corporations continue to treat the spirit and drug cases along scientific lines. They all report at least one-third of their cases permanently cured, particularly where they stay several months. In the neighborhood of large cities both private and public institutions treat large numbers of periodic drinkers, who come at the beginning of their paroxysm and are enabled in this way to shorten it, or whom come after the paroxysm is started and receive positive help. Such persons are actively engaged, and realizing the drink storm, learn to seek help from institutional care and treatment.

The first medical society in the world, for the study of alcohol and other narcotics, held its 45th annual meeting at Washington, D. C., last month. The papers presented, gave a wider view of spirit and drug narcosis, and showed conclusively that it is a field for medical practice, that all such persons are curable, particularly in the early stages, and that at all times they can be benefited by wise medical care and treatment. Also, like many other diseases, it required special treatment at the start. Then the after care could be carried on by any family physician who recognized the general principles of the neuroses and psychoses from this source. All of these papers protested against the irregular and dogmatic specific treatments of the present, and urged that the spirit and drug neurotics be made the subject of special study in colleges; and that farm colonies for the treatment of the indigent should be established in all the towns and cities of the country, and places for the private medical care of persons who could pay for such treatment, should be organized and supported.

General Scientific

EYESTRAIN THE CHIEF CAUSE OF STIMULANT AND NARCOTIC DISEASES.*

GEORGE M. GOULD, M.D.
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In all the infinite universe of planets, suns, stars, and spaces there is not, outside of the skull and of the psyche within that skull, such a thing as light or color. There are only waves of colorless and lightless ether, waves so small that our short octave of colors is composed of millions of single threads each pouring 400 to 700 millions of millions of these ether waves per second into the eyes. We have not the faintest idea of how these black ether waves are made into color or light. We know only that an intelligence and cunning so infinitely greater than ours that we clumsily call it divine, made the mechanism of light and color sensation through which was rendered possible our life, and mind, and body. "And God said, *Let there be Light,*" is thus the great truth that stands first and supreme in the history of Genesis, in the evolution of the animal world, and in the making of our minds and bodies.

Not only does this ocular mechanism of ours create the light and color by which we see and act and live, but it is so cunningly constructed that, like the photographic camera, it also makes the pictures that render light and color useful. Not only does it make the pictures, many every second of our waking life, but in some miraculous way it stores these pictures in a great living photograph gallery called Memory. This memory, organic, conscious, also runs back through all our ancestors since eyes were created. Thus is constituted not only the individual, that is, the ontogeny, but also the phylogeny or racial history. And so is evolved the greatest and most comprehensive truth of Science:—*The Ontogeny Condenses and Repeats the Phylogeny.* This racial and individual picture-gallery which makes Memory as we know it, is the very substance of Personality. Without the memory of the past ancestry the present individual could not have come into being, would have no peculiar and epitomizing kernel of character: and without the addition of the individual experience added to that of the past, we should have no living unity of past and present fused into character and psyche. We add to the picture gallery of Memory, consciously or unconsciously, a million or more pictures every day. And yet any one picture, any thousand, any million, is fused into an organic continuum, or individual, and can be called up to teach the present living person all the lessons of past experience.

The eye is also the incarnation of all the geometric lessons and learnings of the past, and the pilot of every picture-forming, picture-guided act of the present. No act of any muscle or combination of muscles physical or mental exists, no reading or writing, no thinking, can be incited or carried through except by the geometrical experiences and knowledge learned through and laid down by visual experience and lessons. A minor proof of this is suggested by our dreams which are almost solely visual in origin and nature. If in dreaming we heard sounds as vividly as we see pictures we should be instantly awakened.

It thus becomes clear that the racial experience and endowment is that which in the last individual up to now was true or correspondent to the laws and nature of the external world. Our every act and thought is the pouring of life and desire into fact according to the uniform geometrical laws and necessities of all past and present experience. The visual system is the result of millions of years of experience in seeing, through the weeding out of the more faulty seers, and by the neural and mental perfection of the better seers. The faulty visualizers were *ex necessitate* shut out and the better ones passed the inheritance on. The modern eye should therefore be so near emmetropic and accurate that it fits best in and best utilizes the world about us. If not, both eye and the body it governs will be unable to compete, and will be wrecked: unless some artifice enables it to compete, especially for all work within one or two feet from the eyes.

Thus we come to the essence of the matter that all good vision and successful competition in our life depends upon approximately perfectly shaped and perfectly functioning eyeballs. A variation in either or all of three dimensions of the eyes so small as 1/100 or even 1/300 of an inch may so handicap the owner that, without artificial compensatory helps, he will be shut out of competition in the near-range tasks of our present daily life.

There are several ways in which the eyes are thus pathogenic and lead to exclusion or death of the last individual link:—

1. By being too short, i. e., hyperopic.
2. By being too long, i. e., myopic.
3. By malcurvature of the cornea—astigmatism.
4. By presbyopia, or inelasticity of the lenses, beginning at about 40 years of age and complete at about 60. This doubles and trebles all previous strains.
5. By lack or balance or coordination of the external ocular muscles—Heterophoria, and strabismus.
6. By amblyopia, from any cause and kind—from disuse, corneal, lenticular (cataract), retinal, cerebral, etc.

Hyperopia, myopia, and astigmatism are the original or primary causes of all muscle-troubles, of most amblyopias, and of cataract. Presbyopia demonstrates the impossible task of keeping the accommodation active for more than half of the usual lifetime.

Eyestrain is the crude word used to suggest and poorly express the morbid results of these six chief defects of the eyes, or, of vaster importance, upon the general nervous and bodily organs. But we are sharply brought up standing by the fact that there is probably not a pair of eyes in the world without one or more of these defects—less in youth, increasingly so as the years pass, and particularly so in those who do much reading, writing, or other near-range work. Every one becomes presbyopic at from 38 to 42, and therefore vital statistics show a resultant increase of deaths after 40 of some 20% in the last 30 years. A big share of the photographs of eminent men taken after 60 show that one eye (usually the left of course) is out of use even for distant vision. Senile cataract is preventable by correct spectacles. More than upon any other single factor, perhaps more than by all others, the general morbidity and mortality rates depend upon the diseases caused by eyestrain. This is because the direct and indirect diseases of eyestrain are blunderingly supposed to be purely extraocular, originating in the systemic organs themselves, anywhere, anyhow, but not in the eyes. But *corruptio optimi pessima* is an old ever-new truth, and if accurate physiological vision is of such instant, vast, and absolute importance to civilized man, untrue and abnormal vision, especially at our near-range tasks for which the eyes were never made, must play as great a role in sickening and killing him. The conclusion may

* Read before the American Medical Society for the Study of Alcohol and Narcotics, Washington, D. C., Dec. 15, 1915.

not be blinked even if the premises are denied. Every day's advance of our civilization increases the tragedies of its near-eye workers, and increases the numbers of such workers.

What now are the disabling and life-shortening symptoms and diseases which primarily or secondarily produce from 50 to 75 per cent. of the sicknesses of the great majority of our people for nine-tenths of the length of their lives? They are the diseases of eyestrain. The commonest most universal is headache, foolishly called migraine. When dizziness, nausea, vomiting and many other digestional diseases are added the migraine is called sickheadache. Up to 40 or 45 years of age 99 per cent. of headache and sickheadaches patients are curable by scientific spectacles.

After 45, many secondary and mental diseases have usually been set up, so that cure is less certain. Headache and sickheadache soon bring in their train a score of other symptoms and diseases which the neurologists, alienists, and surgeons, and sanitarium doctors foolishly suppose are without cause and which they treat forever without curing. These afflictions at one or two or three removes are most of the pelvic diseases, especially of women, many nutritional diseases, practically all so-called neuritises, and perhaps three-fourths of all nervous and mental diseases. It would take a good half hour to enumerate them.

Even in the cases of many diseases seemingly without relation to eyestrain we commonly forget the old truth that in both pathogenesis and farming the soil is as important as the seed; and hence most all infectious diseases owe their evil roles to the denutrition and morbidities set up by and rooted in a morbid soil. Of all the causes of bad soil the eyestrain diseases are preeminent.

Then come the Master-diseases called Senescence, beginning 40 years before any necessity exists, 90 per cent. due to eyestrain. And lastly, the hand of Death, growing more heavy during all the needlessly long struggle.

All through these long eyestrain lifetimes the worst diseases are the despondencies, griefs, disappointments, caused by inability to do the work of life, to keep sickness away, to compete in any calling,—because eyestrain is the greatest cause of failure in life, loss of time, loss of working ability, etc. Eyestrain renders more lives inefficient than all other causes combined.

The egregious, criminal, and barbaric blunders of medicine and of philanthropists is the nonrecognition of these things as the real source of our outrageously high morbidity and mortality rates. The origin of this world-wide tragedy lies in the shameless ignorance of the nature, importance, and role of vision in the evolution of the life of civilized peoples. The world of plant-life has no eyes; the tree cannot walk, is rooted to one spot. All animalian motility is governed by accurate vision. The less perfect the vision the more surely will the whole organism be wrecked. The development of all higher life or modern peoples has depended and still dangerously depends upon this factor. Every muscle and act in our lives is under the direct spur and governance of the eyes. The invention and use of our alphabet is by all odds the greatest single cause of the civilization in which we live, and these letters of the alphabet are or were conventionalized pictures of the commonest objects about us. Hence, when every instant's seeing is untrue and abnormal, when the ocular picture of every object outside is distorted, wrongly shaped, and untruly placed, the mind and life and action of the seer becomes a short or wretchedly long struggle against danger and disease. The spring is poisoned at its source.

The answering question to all of this comes quickly, and your thought has asked: "But the American world is beglassed by the million?" The reply arrives without a second's loss—"And nine-tenths or more of all glasses worn create rather than relieve eyestrain and its sequent diseases." If astronomers, engineers, pastry cooks, or shoemakers were so inaccurate in their work as the run of those prescribing spectacles and eyeglasses, there would be no science of astronomy, no surveys that would hold in law, no edible puddings and pies, and we would all have to go barefoot. One patient has been sent to a score or two of those allowed and proud to diognosticate ametropia, and all prescriptions differed so radically that if any one could cure, all the others could not. It is funny, it is tragical, it is the farce of civilization, but, alas and alas, it is a real just-so story. And yet, and however, mark well, you must not say this even in a whisper, and not outside the center of a big desert, or you'll get all the persecution and misfortune you can endure in this world.

Glance at another aspect: About 6%, i. e., some six millions of our people are or were lefthanded, and they became so because they were as babies left-eyed. The fact should have a mighty effect on all refractionists. It has none; and these millions suffer atrociously because of the ignorance and ignoring of the fact. The foolish school-teachers and parents double the trouble by trying to make the lefthanded into righthanded. What a crime against the pupil and one's own children!

Of many such crimes is the fact that the great disease-factor of spinal curvature is by all of unknown origin, its cause equally unknown, its cure not guessed at, its hideous disease-effects unthought of: and yet, what part of our millions of our schooled American folk do you suppose have this terrible disease? If you doubt it can easily be demonstrated that the proportion is from 80 to 90 per cent. Cause and prevention are known. If only there were any desire for the knowing, and wish to spare the little folk such unholy fates!

Now the question that doubtless has been banging to the front in your minds is: "What has all this to do with stimulants and narcotics?" I premise by way of preparation for an answer that you are thoroughly aware that the use of stimulants and narcotics is recognized by everybody as one of the most hideous, dangerous, expensive, and debauching evils of our life to-day. The drunkards and dopers are in every walk of private life, in half our homes, high and middle and low, in asylums, charitable institutions, sanitariums, hospitals, prisons. The drugs are almost innumerable, the bedrugged utterly so. We as a people are going hellwards at a breakneck pace, in our use of any stimulant or narcotic that will falsely seem to raise us above the hopeless pessimisms and other morbidmindednesses, pain, disease, incompetence, failure, and crime. As to alcohol we know well enough that prohibition increases its consumption; and the greater the number of drinkers the more they drink. And the more drinking the more nicotine and narcotic poisoning, and coffee-intemperance. Every drug store will give you caffeine for a nickel, and many caffeine drunkards take a dozen glasses or more a day of this poison unprohibited by any law of legislature or morals. Who has any half accurate knowledge of the amount of opium, morphine, cocaine, etc., used in homes and hospitals and institutions without and with medical sanction? Statistics are beyond all calculation. Is the Harrison law not already a pretty big failure? Little is left us except shuddering.

Dr. Farr, the greatest of Vital Statisticians, long ago estimated that for every death there were two years of

sickness. It would to-day in the United States be much nearer the truth to say that for every death there are 20 or 30 years of sickness. Everybody, in fact, is sick a big part of his, or rather her, life; many, oh so many, their whole lives. In my case-records, I get tired and heartsick of chronicling, "Headaches, vomiting, stomach-troubles, constipation, nervousness, neuritis, despondency, inability to sew, read, write, work, hopelessnees, etc., ever since I can remember." The few that escape such ills are those who can hire unfortunates to do their writing, typewriting, reading, sewing, machine-running,—all their near-range or hand work. And these last vicarious atoners soon "go to pieces," get "neurasthenia," get poorer and poorer, or go health-hunting and doctoring and drug-taking; and a great big lot of them die a supposedly necessary death, and other thousands kill themselves in despair of cure. And how, with presbyopia at 40, 45, and 50, these pitiful victims increase and rush faster to ruin. The leaders and the majority of the led are constantly flattering themselves that medical practice is scientific. The truth is that it is not. It is practically empiricism, for the most part. Even as regards the infectious diseases it is at best but half scientific, and the infectious diseases play a small role in actual humdrum practice. It is time that we should rid our minds of cant and self flattery.

The conclusion to be drawn is plain to all except to those who have not shut their minds and morals up in a brutal and stupid slavery to outworn illogical medical theories as to the etiology of our commonest diseases. Without prejudice read the biographies of a score or of hundreds of our most famous literary, musical, and scientific men and the fact glares at you that their wretchedness, their ghastly confessions of suffering, pessimism, atheism, and failure were caused by the diseases of eyestrain. Look at the inner histories of your acquaintances and neighbors and the same facts are as appalling. By a pair of spectacles, I have cured 15,000 or 20,000 of such patients and turned their living from utter tragedy to health and vigor. If I am greeted with a sardonic smile and cries of *Exaggerator, Crank,* and *Hobby-rider,* all I can say is that every great discovery has first to meet the selfishness, and hatred of those who for some thirty years make martyrs of the heroes of philanthropic discoveries. Read the histories of the discovery of the prevention of puerperal septicemia, and see how Semmelweiss was treated, martyrized, killed by the official leaders and of the sorry led; of the way the discoverer and prover of vaccination was ignored, and is ignored to-day. That discoverer and prover was not Jenner, but an old farmer, Benjamin Jesty. Jenner worked his life out to overcome the bigotry of his fellow physicians, and even then almost failed. Thank Heaven and his stout heart that the stupids were finally conquered.

My theories may be false, and I may be an unscientific crank, as to the role of eyestrain in first producing the millions of tragedies in our civilization, and in the second place of bringing about the despicable debaucheries of alcoholism and narcotics in an attempt to relieve or deaden the reflex sufferings caused by eyestrain; but the way to prove that I am in the wrong is to stop sneering and test the theory out. Prejudice and bitgotry only kill and maim and prevent progress. The body of proofs is already astonishing. Hundreds of brave medical witneses are on record, thousands of happy patients will also testify.

The fact is that the role of physiological vision as I have tried to tell is essential to the making of personality, and, in the majority of our people, necessary to the health and efficiency of life. It is also a fact that pathologic vision is the fate of the majority of the more civilized peoples. Struck by the inescapable fatality of morbid vision millions of our fellows are sickening and dying of systemic diseases that fashionable medicine mistakenly traces to a hundred other causes than visual pathology. These theories seen justified by the lamentable failures of the fashionable oculists and opticians correctly to diagnose and treat ametropia. Hence the weird nonsense of fashionable therapeutics and of unjustifiable surgical operations. The sole solution often remaining to both the unawakened doctor and patient is recourse to stimulants and narcotics with a world of dolorous patients drifting along and all about awaiting the final therapeutics of Dr. Death.

PNEUMONIA IN INFANCY AND CHILDHOOD.

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The physician, when called upon to treat a case of pneumonia in an infant or a young child, is mainly interested in the diagnosis and therapeutics, because the diagnosis of pneumonia during infancy and childhood is in many cases much more difficult than during adult life. While the bacteriology, pathology, laboratory findings and statistical data are extremely instructive and interesting they are not considered essential by the busy physician in the care of his little pneumonic patient. The young patient tells us no tales, he cannot help the physician by his subjective feelings of pain and discomfort, and the history of the case as given by the mother or nurse is not always definite and reliable.

A diagnosis of pneumonia in early life is therefore made chiefly on the clinical course and the physical findings, though they are not always typical and book-like. To make an early and proper diagnosis careful inspection is of the first importance. To the trained physician's eye a pneumonic child looks pneumonic. Palpation, percussion and auscultation together with the clinical course will bring out the other evidence of a pneumonic condition. An isolated sign or symptom, while it may be suggestive of a pneumonic process, should not be relied upon in making a diagnosis. I have seen a few cases where the diagnosis of pneumonia was made because the infant or child happened to have a high fever and some spot of dullness in the lungs. On careful physical examination I found the dullness to be due either to the result of a former pathologic condition of the lungs or to a congenital atelectasis and the fever was caused by some gastro-intestinal upset or a local infection.

The differential diagnosis in some cases between a bronchitis and a broncho-pneumonia and between a lobar pneumonia and a broncho-pneumonia, while very important in the therapeutic management of the case, is not always easy. The areas of consolidation in a broncho-pneumonia may be too small to be elicited on physical examination and the bronchitis may be the only evidence of a pathologic process. A lobar pneumonia may have an associated bronchitis and a broncho-pneumonia may have a single well-defined area of consolidation. If in doubt between a bronchitis and a broncho-pneumonia, the little patient's general appearance will aid in the diagnosis. A child with a broncho-pneumonia looks too sick for a simple bronchitis and it is always safer to treat it as a broncho-pneumonia.

When it is difficult to differentiate on physical findings between a lobar pneumonia and a broncho-pneumonia, the onset, course and termination will help in the

diagnosis. In a previously healthy child, a sudden onset with high continuous fever and signs of consolidation point to a lobar pneumonia. Of course the typical drop in the temperature at the crisis makes the diagnosis certain. A sickly child or a marasmic infant with a gradual onset, irregular temperature and irregular termination with signs of a pneumonic process will usually prove to be a broncho-pneumonia. Tuberculous pneumonia and pleural effusion must always be borne in mind in making a differential diagnosis.

Whether a case is a lobar pneumonia or a broncho-pneumonia or no pneumonia at all, it is absurd to make a diagnosis of a touch of pneumonia, just as it is absurd to make that popular diagnosis of a "touch" of consumption or a "touch" of the grippe, or any other "touch" disease. A patient may or may not have a pneumonia or consumption or the grippe or any other disease but he never has a "gentle touch of it." Diseases may be classified as mild or severe, incipient or advanced, but not as real diseases and as touches of diseases.

The treatment of pneumonia in infancy and childhood differs according to the condition of the patient before he became ill and with the condition during the pneumonic course. In lobar pneumonia, which is usually a primary disease, the physician treats a healthy child sick with pneumonia; while in broncho-pneumonia, which is mostly a secondary or terminal disease, the physician treats a sick child sick with pneumonia. In a lobar pneumonia, if the disease runs a normal course and there is no complications, all that the little patient needs is complete rest, proper feeding, general hygienic care, plenty of fresh air and little or no medicine. I saw in consultation a child eight months old with a well developed pneumonia who was under the care of two physicians at the same time, and both of whom prescribed medicines. I found there was nothing unusual in the pneumonic course except that the infant was over medicated. At my suggestion all the medicines were discontinued and in addition to perfect rest, fresh air, regular proper feeding, 1/200 grain of strychnin was given every four hours. The patient made a complete recovery, but I am not sure that he would not have gotten well without this single drug.

In a severe condition of lobar pneumonia and in broncho-pneumonia the patient should be treated with great care. He must be disturbed as little as possible, the feeding should be at longer intervals and suited to his digestive ability. Fresh air, not too cold, in broncho-pneumonia and in asthenic condition of lobar pneumonia is very essential in the successful treatment of this disease. The bowels, kidneys and skin should be kept in a perfect physiological condition. To give a pneumonic patient irritating and nauseating expectorant mixtures is very poor therapeutics. A few useful drugs to sustain a proper circulation and to relieve cough and sleeplessness is all that is necessary and should be given in the right time.

Hydrotherapy takes an important place in the therapeutics of pneumonia. Of all hydrotherapeutic measures sponging with cool or tepid water and the Priessnitz application are the most useful. I found the Priessnitz application does much good when properly applied. It has a primary stimulant effect on the nervous system, it deepens the respiration and increases the tonicity of the cardio-vascular system, later it reduces the temperature and causes calmness of the nervous system, the child falling into a refreshing sleep. Too frequent applications as is commonly done is not desirable, it only tends to disturb the little patient, when perfect rest and sleep does so much good.

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The American Association of Clinical Research

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POTENTIALITIES AND POSSIBILITIES OF RADIUM.*

Developments Resulting From Research Work With Radium.

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Recent additions to our knowledge of the physical and chemical properties and potentialities of radium suggest a wider field of usefulness and greater possibilities, medically and surgically, for this new and remarkably "active" element.

The increasingly optimistic reports from conservative clinicians has increased the demand for and consequently the cost of the rare metal far beyond the reach of the general practitioner. Its scarcity and the expensive processes of extraction and concentration are, however, not the only reasons why it requires a comparatively large investment to secure an amount sufficiently large to comply with present-day standards for adequate dosage. Depending on the field of operation, whether superficial or deeper tissues are to be treated, a working supply would cost from $5,000 to $50,000.

One of the reasons why radium is so costly is the fact that the concentrated salts of radium are applied in tubes or capsules directly to the part treated. Extreme concentration of the radiations is absolutely necessary to produce the desired effects. Therefore, the greatest possible concentration of the radium salt in the tube is necessary to supply the radiations in concentrated form. The producers of radium claim that the last concentration and separation of radium from barium, with which it is closely associated, is extremely difficult, and hence increases the cost. Another factor having a very practical bearing on the quantity of radium required to give the desired radiation is the fact that the technic now generally practiced applies or utilizes only a part of the gamma rays, carefully excluding the alpha and beta rays, which represent or carry 95 per cent. of the total energy of this extremely active and energetic element. Developments in technic which utilizes a larger portion of the available energy of radium, thus increasing its efficiency tenfold, equivalent to a corresponding decrease in the cost, as a smaller quantity would suffice since its energy would be more completely utilized, will be more fully described later.

The great practical importance of Rutherford's discovery, in 1903, that the penetrating gamma rays do not spring directly from radium but from the secondary active deposit resulting from the breaking up or disintegration of the radium atoms, is just beginning to be appreciated. One of its advantages has a definite bearing on the cost of the radium necessary to supply the gaseous emanation which Rutherford demonstrated is transformed spontaneously and successively into the

* Read at the seventh annual meeting of the American Association of Clinical Research, Sept. 24, 1915, at Philadelphia, Pa.

active deposits called radium A, B and C, the latter being the source from which the gamma rays radiate. It is not necessary to have radium in concentrated form in order to secure concentrated emanation. This can be extracted from solutions of radium salts, which need not be highly concentrated, but which yield 40 times the volume of emanation available from the solid salts of radium. Emanation can be readily concentrated in very small capillary tubes or needles which are applied superficially or sometimes are inserted directly into the tissues. In this manner large masses may be radiated thoroughly with massive and evenly distributed dosage. Considerable time is required to prepare the tubes of concentrated emanation which disintegrates rapidly, 50 per cent. in 3.85 days. The advantages of the method are that the emanation may be obtained from *less concentrated* soluble radium, *therefore less expensive* than the concentrated salts heretofore and still generally used, and that *it is possible to concentrate the emanation* from a very large amount of radium *into very small space,* thus securing infinitely greater concentrated radiations than is possible from tubes containing the concentrated salts.

The real significance of Rutherford's classification of the secondary products formed in the radio-active processes which he called the "disintegration theory" is not generally known, although it has withstood all criticism for 12 years and is now accepted by radiologists as definitely established.

The radiograph shown here was made by the author to convince doubting colleagues of the correctness of Rutherford's conclusions. Radium emanation was allowed to accumulate in a sealed jar of two liters capacity containing 4 milligrams of radium element dissolved in one litre of strong hydrochloric acid. The accumulated emanation was drawn off and concentrated in a large test tube half full of cocoa charcoal, which ab-

Radiograph made by J. M. Craig, M.D. Using concentrated radium emanation as source of gamma rays. The alpha and beta rays were excluded by screens.

sorbed the greater part of the emanation. A Yale key was placed over a photographic plate covered with sufficient screens to protect the plate from the alpha and beta rays. The radiograph was therefore made from the gamma radiations, which must have been produced from the emanation or its active deposits formed in the test tube.

Incidentally the experiment demonstrated the high absorbing power of cocoa charcoal for emanation. When sufficiently concentrated, radium emanation will cause a zinc sulphid screen to fluoresce. A screen was prepared and fastened on the inside of the test tube near the top. When cold the emanation was so completely absorbed by the charcoal there was not enough in the upper part of the tube to illuminate the screen. Upon warming the charcoal the emanation was driven upwards in sufficient volume to distinctly illuminate the zinc sulphid screen. The fluorescence being caused by the action of the various rays, principally the alpha rays, proves that they also come from emanation and its active deposits.

The radiograph of the key *proves that gamma rays came from the tube containing only emanation and its active deposits. The only radiations which come directly from the primary radium atoms are the primary alpha particles,* the expulsion of which marks the first step in the dissolution or disintegration of radium. The residue of the disrupted radium atom becomes an atom of the gas discovered by Rutherford, who called it "emanation." Sir William Ramsay has suggested "niton," meaning "the shining one," a very appropriate name because of its spontaneous fluorescence when sufficiently concentrated.

The emanation atom after the expulsion of another alpha particle becomes the active deposit called for convenience radium A. Radium A expels another alpha particle and a soft beta ray, the residue becoming radium B, which, after giving off a beta ray, becomes radium C. Radium C is the most important member of the series, because it gives off all three rays, alpha, beta and the very penetrating gamma rays. Radium D, E and F are similarly formed. Their radiations are of no therapeutic value, therefore will not be considered here.

The above classification is not a working hypothesis. It is a simple statement of demonstrated facts in the order of their occurrence. Each member of the series was isolated or separated from the others and its physical status and characteristics conclusively determined. We now know not only the particular ray or rays emitted by each member of the radium series, but also know their range, velocity, penetrating powers, caloric value and ionizing effect, from which has been determined the exact percentage of energy liberated or carried by each member or radiation. The "half life period" called the "period" is the time in which one-half of a radio-active substance disintegrates or changes into its successor. Each member of the series is therefore the residue of its progenitor in the order shown in the following table:

Radium Series.

Substance	Atomic weight	Period	Radiation	Per Cent. Alpha	Energy Bt. Ga.
Radium	226	2,000 Yrs.		19	Neg.
			B (soft)		
Emanation	222	3.85 Days	Alpha	21	
Radium A	218	3.0 Min.	Alpha	22.7	
Radium B	214	26.7 Min.	B (soft)		Incl.
			G (soft)		RaC.
Radium C	214	19.5 Min.	B (hard)		3.2
			G (hard)		4.8
			Alpha	29.3	
Radium D	210	16.5 Yrs.	B (soft)		Neg.
			Totals	92	3.2 4.8

Attention is called to the systematic reduction in the atomic weight of the radium series. This is explained by the fact that each alpha ray or particle has been demonstrated to be an atom of helium, atomic weight 4. There is no reduction of the atomic weight of radium B. The beta and gamma radiations are electrons whose weight is not determinable.

The percentage of energy carried or liberated by the above substances and their radiations were calculated from Rutherford's determination of the total heat production of one gram of radium in equilibrium with its products (emanation and its active deposits), which he

found to be 134.4 gram calories per hour, 123.6 for the alpha rays, 4.3 gram calories for the beta and 6.5 gram calories per hour for the gamma rays. (*Radioactive Substances, Rutherford,* p. 581, 1913.)

The relative percentage of energy repesented by the different radiations above described corresponds closely to the results obtained by the ionization method. By this means a direct electroscopic measurement or determination of the degree of ionization produced in a definite time by the different radiations from a definite quantity of radium in equilibrium with its products was made. The percentage of ionization produced by each type of ray was found to correspond closely to the percentage of heat produced by the same type of ray.

Rutherford's classification and analysis of the disintegration products from radium proved conclusively that the gaseous emanation carries 81 per cent. of the *potential* energy bound up in radium. This can be easily separated from its progenitor and can be condensed into very small compass as a gas from which the active deposits Radium A, B, and particularly radium C, are derived, also the *entire* hard or penetrating beta and gamma radiations and the greater part of the alpha rays. The emanation and active deposits are formed within the tubes containing the concentrated salts of radium. Only the gamma rays are allowed to escape, however, and these are modified more or less by metallic screens or filters before they reach the surface or part being treated to prevent burning, as generally applied. This method utilizes a very small part of the gamma radiation for superficial applications. The rays radiate in every direction equally from the center of the tube, therefore only the rays which go directly or obliquely from the tube to the surface treated will come in contact with the part. For this reason and in order to utilize the entire radiation, tubes are buried in the tissue or tumor when possible. Attempts are being made to use the beta radiations in addition to the gamma, which bids fair to prove feasible in certain conditions.

Because of their slight penetrating power the *alpha rays carrying 92 per cent. of the total energy of radium remain unused, locked up, in the tubes* in which it is formed. It is well known that alpha rays when sufficiently concentrated and brought in close contact with animal or vegetable tissue cells stimulates their functional activities when subjected to moderate radiation and depresses functional activities when under stronger or more intense radiation. The depression may be pushed to the complete disintegration of the cell or tissue. Experimental efforts are being made to utilize the heretofore unused 81 per cent. of energy represented by emanation and its active deposits, by direct injection of concentrated emanation into the tissues treated. Since the emanation will escape rapidly, the injections have to be repeated at frequent intervals in order to maintain a high degree of radiation. The slight penetrating properties of the alpha rays is compensated for, to some extent, by their greater volume of energy. Furthermore, it must be noted that they are liberated throughout the tissues from the emanation itself and the active deposits formed wherever the emanation has penetrated by diffusion. Therefore *the unobtrusive alpha ray acts where it is produced,* very near if not actually inside the cell walls. Concentrated alpha radiations cause rapid dissolution of tissue, therefore applicable only to conditions where adequate drainage is possible. Their well-known stimulating effect on granulation tissue compensates satisfactorily for any destruction of healthy tissue incident to the treatment.

The potential energy of radium emanation has been determined by Mme. Curie, Proffessors Mache and St. Meyer, Duane, Rutherford and others (Radio-active Substances, Rutherford, 1913, p. 502). The determination is based on the degree of ionization of air produced by emanation in equilibrium with its products radium A, B and C. One curie of emanation in equilibrium with its products gives a total ionization current of 8.9×10^6 electro-static units.

The number of alpha particles and the ions produced by them is stated by the following equasions: "One curie of emanation, alone, emits 3.4×10^{10} alpha particles per second, and the total number of ions due to one alpha particle from it is 1.74×10^5. Consequently the total number of ions produced per second by the radiation from one curie of emanation by itself is 5.9×10^{15}." Since the above represents only the emanation alpha ionization and we know that radium A and C each emit an equal number of alpha rays, the total number of alpha rays emitted and the total ionization produced by them is exactly three times greater than the figures given above for emanation only.

The "curie of emanation in equilibrium" is the term used to indicate the maximum concentration of emanation possible from one gram of radium element when its output of emanation is conserved in a sealed container for a period of 30 days. The terms "millicurie" and "microcurie" denote the equilibrium amount of emanation, secured in the same manner, from one milligram and one one-thousandth of a milligram respectively of radium element. The smaller units are the ones generally used. One microcurie of emanation is the equivalent of 2,670 Mache units.

Chemical Effects.

The production of ozone by the rays of radium was early observed by M. and Mme. Curie (C. R. 129, p. 823, 1899). This effect they reported seems to be due mainly to the alpha radiations, and is very marked under intense alpha radiation. The alpha rays rapidly oxidize various metals with rapid production of ozone in the air. Water is decomposed into hydrogen and oxygen. Organic matter is rapidly decomposed with evolution of gases, particularly carbon dioxide gas.

Ramsay (*Journ. Chem. Soc.* 91, p. 931, 1907) found that purified emanation mixed with carbon dioxid transformed the latter into carbon, carbon monoxid, and oxygen. Carbon monoxid was decomposed into solid carbon and oxygen. Ammonia was changed into nitrogen and hydrogen. The proportional chemical change at any time was found to accord with the activity of the emanation.

The discovery of the marked ionizing and oxidizing properties of radium emanation and its alpha rays suggested that it should be of considerable therapeutic value in internal medication.

The physiological effects thus far determined and reported can only be enumerated in this paper. Some competent observers believe that the glandular secretions and ferments are increased both in volume and action, others failing to find any increase in volume admit observing apparent increased action and activity of the digestive ferments including the increased digestion of starch by dextrin in the presence of emanation. The general metabolic processes are improved, evidenced by increased appetite and consumption of oxygen and elimination of carbon dioxide. Its marked diuretic action increases the urinary output, particularly the nitrogenous elements. Its analgetic and soporific action has been noted by all observers. Its decided reduction

of hypertention when given in adequate dosage is well known and established beyond all doubt.

Its stimulation or activation of the autolytic ferments as well as the general cellular functions and metabolism has been suggested as the probable explanation of the favorable results in the treatment of some forms of chronic arthritis and true uric, acid gout.

Whatever the ultimate explanation of how emanation acts, it is a fact that its use for a sufficient time has resulted in the apparent cure or marked improvement in a large percentage of cases of chronic arthritis.

Extensive inflammatory deposits in the soft parts have been completely absorbed, function of joints greatly improved if not perfectly restored. Complete bony ankylosis or conditions of atrophic osteitis with complete destruction of cartilage have not been benefited by radium emanation therapy. That the radiations have a decided stimulating effect on the blood making centers is proved by the marked improvement in the blood picture in both simple secondary and pernicious anemia.

Methods of Internal or Medicinal Application of Radium.

The soluble salts of radium have been administered subcutaneously and intravenously. By this method the total energy or all of the rays are applied directly to the tissues and cells of the organism. The subcutaneous method has been superseded by the intravenous injection method because of serious local disturbances at the point of injection resulting from a precipitation of the radium salt. This difficulty is obviated by the intravenous method since the soluble salts are widely distributed before becoming fixed or deposited in the tissues. The total energy of the deposited radium is not applied directly to the tissue in which the radium has been deposited since the emanation, carrier of 81% of the energy in potential form, is widely distributed by diffusion throuh the circulating fluids of the body. Portions of the emanation are constantly disintegrating into the secondary solid radio-active deposits, radium A, B, C and D. In this way practically every cell of the body feels the influence of the radiations liberated or produced in its immediate proximity. Comparatively large amounts of this active and energetic agent have been administered intravenously by Proescher (Radium, Vol. 2, No. 4) with apparently beneficial effects in polyarthritis and without observing undesirable or harmful consequences, in a series of 30 cases treated with varying dosage over a period of six months. The highest dosage reported is one milligram of radium element or nearly the equivalent of two milligrams of radium bromide. The majority of the series were given from one to three-tenths of that amount and then in divided doses of 50 to 100 micrograms. 1,000 micrograms makes one milligram. There was marked diminution of blood pressure in nearly every case, also changes in the blood picture.

When we remember that the deposited radium will continue to give up its energy in the form of emanation and its radiations as long as the patient lives, such cases should be closely observed during a long period in order to determine the effect of continuous radiation.

Radium emanation was administered quite extensively throughout Europe in expensively fitted up inhalatoria. The great cost of producing a sufficient concentration of emanation in the inhalation chambers, the technical sanitary difficulties encountered in a closed air-tight room, and because the absorption coefficient of the blood for emanation through the walls of the alveoli of the lungs is very low, this form of treatment has been found impracticable and therefore largely discontinued.

The most convenient and economical method of administering radium emanation internally is in potable waters in which any desired concentration or quantity of emanation may be exhibited. The radio-active gas is readily absorbed by the blood and lymph and is carried to every cell of the body. It is rapidly eliminated in the exhaled air, practically entirely within three hours after ingestion, therefore the dose should be frequently repeated. Because of its rapid elimination before much of the active deposits have been formed in the body and because of the very short life period of the deposits, there is absolutely no possibility of cumulative action. For the same reasons enormous quantities of emanation may be and have been given, in a few instances experimentally, as high as a million Mache Units daily. This apparently high dosage, which is transitory, is small compared with the *constant production of emanation and radiations from the radium salts injected intravenously and deposited in the tissues.* If experience develops no untoward effects resulting from its continuous cumulative action, the economic differences between the two methods are worthy our serious consideration, since the scarcity and high cost of radium makes any possible conservation of this rare metal imperative. To inject radium reduces the visible working supply as it is not recoverable. *Soluble radium salts yield* 40 *times the volume of emanation yielded or available from the insoluble radium deposited.* The difference will be more apparent when we compare the quantity expressed in Mache units. One milligram of radium in solution produces, when contained in an air-tight flask, for 30 days, 2,670,000 Mache units. Insoluble or solid radium under the same conditions will only produce 2½% of that amount, or 66,750 M. U. in 30 days. The body not being an air-tight container does not permit the emanation to accumulate to the equlibrium maximum possible when conserved and not allowed to escape, therefore only a small portion of this amount is circulating in the body because of the rapid elimination through the lungs. Sixteen per cent. of the total activity is produced during the first 24 hours, but a large portion of this is eliminated before it disintegrates into the active deposits, which probably explains the total absence of cumulative effects following the intravenous injection of the salts of radium. Another reason is the fact that *only about one-half of the radium injected is permanently deposited in the tissues,* the other half is eliminated within two or three weeks after injection, and is consequently lost.

The economic advantages of conserving the radium and using only its large volume of emanation which is produced at a constant rate are obvious. *In the first place one retains his supply of radium which, if properly conserved, will yield its emanation constantly for centuries to come with almost imperceptible decrease in volume.* This unusual advantage counterbalances the trouble and cost of dispensing the emanation in drinking water which on account of its instability and diffusibility, must be prepared daily and cannot be shipped long distances or kept in stock many days.

Stable preparations of radium water are obtainable. Each bottle contains two micrograms of radium element which produces two microcuries of emanation in equlibrium with its active deposits, in 30 days. The retail price charged the consumer is 50c per bottle of two microcuries. One microgram is one one-thou-

sandth of a milligram, therefore one milligram of radium will make 500 bottles of radium water containing two microcuries of radium emanation each, total cost $250.00, retail. The usual dosage advised is from four to ten microcuries daily, costing from $1.00 to $2.50 per day. *In every 500 bottles one milligram of radium is used which cannot be recovered* as it is excreted in the feces. In proportion to the amount used in this manner the visible supply of radium is bound to decrease, and since only the emanation produced in the water is effective, the radium becomes a total loss.

The enormity of this loss is emphasized by the comparatively large output of emanation obtainable from an apparatus containing only two milligrams of radium element. The apparatus called an "Emanator," was loaned to Prof. S. Solis-Cohen and the writer by the Radium Chemical Co., Pittsburgh, for clinical research and use in Jefferson Hospital. This emanator produces 20 microcuries of emanation in five liters water *daily* or 53,400 Mache units, which if sold at market price would amount to $1,800 annually. The radium if conserved properly will continue to produce its emanation indefinitely whether utilized or not.

Apparatus is offered for sale or rent which is suitable for individual or home use. Each "Activator" contains a preparation of insoluble radium sulphate fixed in a porus cylinder which stands in the water to be "charged or activated." Any quantity of emanation desired can be put in the water by placing the necessary quantity of radium sulphate in the cylinder, to maintain a constant degree of emanation in the water, allowing for the amount to be withdrawn for daily use. The "activators" may be conveniently placed in the home, thus obviating the trouble and expense of bottling the water. The apparatus was designed by Prof. Paul Lazarus, Berlin, author of "Handbuch der Radium-Biologie und Therapie." The apparatus is guaranteed by the radium limited to maintain the indicated activity in constant daily use for a period of ten years. *This is possible for a much longer time provided the radium is permanently fixed in the preparation so that it cannot be mechanically washed out.* The author's experience with a number of them during the last three years has not been entirely satisfactory, probably due to faulty fixation of the radium. Fortunately the makers have replaced the defective apparatuses with others in which they claim to have overcome and corrected the defects of the activators made previously.

The strength or activity of all apparatuses should be carefully standarized or tested by some competent disinterested authority, twice or three times yearly, to prove their constancy and stability. Accurate measurements can be made with the electroscope.

Insoluble radium gives off only 2½ per cent. of the volume obtainable from acid solutions of the salts of radium, therefore the cost or rental of these activators is relatively high, particularly for those of high activity.

The total daily dosage should not be less than 20,000 Mache units. This is not high in view of the fact that fully 90% of the emanation is exhaled, unchanged, and therefore lost. Frequently repeated dosage is therefore necessary in order to maintain continuous saturation of the blood and tissues.

Individualization of dosage seems to be more necessary in giving emanation therapy than many other remedies. Some patients respond to lower dosage readily, while others resist much higher concentrations. It is practically impossible to make emanation water strong enough to produce unpleasant effects as long as radium is so scarce and costly. The greater danger will be that it will not be in sufficient quantities in the activators to be effective—*that it will be used too sparingly rather than too generously.*

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THE EARLY RECOGNITION OF CANCER OF THE URINARY BLADDER.*

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Early recognition is essential to the treatment of malignant disease of any part of the body. Especially is this true of cancer of the urinary bladder, in which the results of all forms of treatment have been most discouraging.

All tumors of the bladder may be regarded as potentially malignant. Even papilloma, the most amenable to treatment of so-called benign vesical growths, tends to come cancerous. Out-spoken carcinoma constitutes about one-half of all tumors of the bladder.

Malignancy once established, the prognosis is discouraging. Could treatment be commenced during the pre-cancerous stage, chances for cure would be greatly increased. Attention is called to danger signals not hitherto referred to, or sufficiently emphasized in medical literature, which tend to early recognition of carcinoma of the bladder.

The most important early symptom is painless hematuria, which may exist long before any other more acute symptom appears, occurring daily, or at very long intervals. Such painless hematuria should lead to careful examination for other evidences of cancer.

Another early symptom is frequency of urination, especially when associated with distress. This is the next most common symptom of bladder carcinoma.

Pain is the third early symptom of this condition. It is usually referred to the suprapubic region, to the sciatic nerve, to the perineum, and to the ureter and kidney of the side affected.

The condition of the urine is important in determining the presence of malignant disease of the bladder. Every case presenting albumin, blood or pus in the urine microscopically, should be immediately subjected to a cystoscopic examination, provided the patient is not too acutely ill. The bladder secretion in this condition also possesses a characteristic odor. If allowed to stand, the urine shows a heavy, thick sediment, more or less adherent to the beaker.

Having been warned of impending malignancy, the author strongly advises cystoscopic examination. A hard, dense tumor, giving resistant feel to the beak of the cystoscope is commonly malignant, as are also tumors encrusted with phosphatic deposits, those showing ulceration, and those close to the prostate. Hardness, rigidity of the bladder wall, of the sphincter vesicæ, and of the prostate, all suggest malignancy. A marked prominence of the inter-ureteral ligament, unevenness of the bladder interior and presence of leucoplakiae, are further evidences of malignant disease. Tumors bordering the sphincter vesicae having long atennae and a very red base, there being four or five within a distance of two or three centimeters, standing out prominently from the muscle under forced bladder distention, are frankly innocent.

Other aids to diagnosis are estimation of bladder

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* Read at the seventh annual meeting of the American Association of Clinical Research on September 23, 1915, at Philadelphia, Pa.